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SECTION 31. Economic research, finance, innovation, risk management.

STUDY ON THE CONSUMPTION LEVEL OF RURAL RESIDENTS IN CHINA

Abstract: *Since the reform and opening-up, great changes have taken place in China and the public standards of living in China's rural areas have improved dramatically. This paper aimed to figures out what factors that make difference on the consumption level of rural residents in China. Three affecting factors were chosen as explanatory variables: Rural Consumer Price Index, per capita disposable income of rural residents, Engel Coefficient of rural households. Then this paper made use of EVIEWS 3.1 for parameter estimation, model test and model modification. Final model estimation results shows that when rural residents' per capita disposable income increases by 1 yuan, rural residents' consumption level will increase by 0.7277 yuan; when the Engel Coefficient of rural households rise by 1%, rural residents' consumption level will decrease by 6.5794 yuan. Some suggestions were also put forward at the end.*

Key words: *Consumption Level, Affecting factors, Rural Residents, China.*

Language: *English*

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1. Introduction

Recent years have witnessed Chinese rapid development in various aspects. Taking its rural residents' consumption level for example, China's residential consumption level is 184 yuan in 2001 and it increases to 10919 yuan in 2010.

Residential consumption level, as its definition says, refers to the attainable level to meet people's demand of surviving, developing and enjoying in the process of the consumption of material goods and services. Residential consumption level is mainly affected by the economy [1]. Gross domestic product (GDP) is an overall economic indicator often used to measure a country's total revenue. When the economy is in its expansion period, the income is stable, the GDP is high, residential spending in consumption is more, so the consumption level is higher; On the contrary, when the economy is in its contraction period, the income drops, the GDP is low, residential spending in consumption is less, so the consumption level also drops.

As the economy grows, Chinese rural areas are also experiencing dramatic change. The living standards of rural residents have generally improved and their consumption level also changes a lot. From 2002 to 2007, per capita consumption expenditure of rural residents increases from 1834 yuan to 3224 yuan, an increase of 75.8% and an average annual growth of 11.9%.In real terms, the average annual real growth rate is 8.0%.In 2007, rural residential spending per person respectively increases by 63.7%, 84.2%, 91.2% and 63.7% than that in 2002 in the aspects of food, clothing, housing and household appliances; the consumption level in traffic communication, cultural and educational entertainment, health care and other aspects respectively increase by 1.6 times, respectively, 45.3%, 1.0 times and 28.7% than that in 2002.From 2002 to 2007, the Engel Coefficient of rural residents' consumption shows a more obvious decline year by year, felling from 46.25% in 2002 to 43.08% in 2007.The Engel coefficient is an international general indicators reflecting the state of the rich and the poor. According to the standard of the United Nations Food and Agriculture Organization (FAO), when the Engel Coefficient is more than 60%, it is for the poor; from 50% to 59%, it is for the sufficiency of food and clothing; from 40% to 49%, it is for the well-off; from 30% to 39%, it is for the rich and below 30% it is for the richest. In accordance with the above standard, Chinese rural residents' consumption level is in the stage of well-

off, and the consumption level is still increasing year by year.

Consumption have always been the focus and hot of economics research, There are many domestic experts and scholars studying the problem from the aspects of income, consumption expenditure, prices, gap between the rich and the poor, regional industry and so on[2] [3] [4]. In this paper, in order to know more about the consumption level and maintain sustainable economic growth in China's rural areas, affecting factors were studied with a large number of empirical data of the consumption level of rural residents in China.

2. Materials

In this paper, rural residents' consumption level was seen as dependent variable, represented by Y, and three affecting factors were chosen for the research: Rural Consumer Price Index, per capita disposable income of rural residents, Engel Coefficient of rural households.

According to relevant economics theory, income is main factor influencing the consumer. For example, it is told in Keynes's absolute income theory that consumption is a function of people's income level and its formula is as follows: $C = \alpha + \beta Y_t$. In this formula, C is for current consumption,$\alpha$is for autonomous consumption,$\beta$is for marginal propensity to consume, Y_t is for immediate income, and βY_t is for induced consumption. That is to say that consumption is the sum of autonomous consumption and induced consumption, and consumption mainly depending on immediate income will increase with the increase of income [5]. On the other hand, in the relative income hypothesis proposed by James Stemble Duesenberry, consumption is up to income distribution and the highest income level of consumers in the history. Duesenberry put forward that consumption does not depend on current absolute income level but on relative income level, including two aspects: one is the income level relative to other people's income level, referring to that consumers' consumption behavior will be affected by each other, generally called "demonstration effect" or "bandwagon effect"; the other is the income level relative to consumers' own historical consumption level, referring to that because of consumers' consumption habit, their consumption will not necessarily reduce immediately when their income reduces , generally called "habit effect" [6]. Therefore, considering a decisive role the income plays in consumers' consumption level, in this paper, per capita disposable income of rural residents was used as one of explanatory variables, represented by X_2.

Another affecting factor considered is price. Price is the expression form in currency of commodity value. Commodity prices directly have something to do with the vital interests of buyers and sellers, and also directly affect consumers' purchase intention of certain goods as well as their purchase quantity. Commodity price is the most sensitive factor of consumers' purchase psychology. Price as an objective factor has impact on consumers' purchasing psychology, thus further influences consumers' buying behavior [7]. As the consumer price index is used to reflect changes in the price level of household goods and services, so in this paper, Rural Consumer Price Index was used as the second explanatory variable, represented by X_1.

The third explanatory variable in this paper is Engel Coefficient of rural households, represented by X_3.Engel Coefficient is household expenses for food as a percentage of total expenditure for a period of time. Usually, the lower the coefficient is, the higher people's consumption level is, and the higher the coefficient is, the lower people's consumption level is [8].

This paper collected the related data of rural residents' consumption level from 1991-2010 in China, as is shown in the following table. All data is from China Statistical Yearbook.

Table 1

Related data of rural residents' consumption level from 1991-2010 in China.

year	Y	X_1	X_2	X_3
1991	602	102.3	708.6	57.6
1992	688	104.7	784.0	57.6
1993	805	113.7	921.6	58.1
1994	1038	123.4	1221.0	58.9
1995	1313	117.5	1577.7	58.6
1996	1626	107.9	1926.1	56.3
1997	1722	102.5	2090.1	55.1
1998	1730	99.0	2162.0	53.4

1999	1766	98.5	2210.3	52.6
2000	1860	99.9	2253.4	49.1
2001	1969	100.8	2366.4	47.7
2002	2062	99.6	2475.6	46.2
2003	2103	101.6	2622.2	45.6
2004	2319	104.8	2936.4	47.2
2005	2579	102.2	3254.9	45.5
2006	2868	101.5	3587.0	43.0
2007	3293	105.4	4140.4	43.1
2008	3795	106.5	4760.6	43.7
2009	4021	99.7	5153.2	41.0
2010	4455	103.6	5919.0	41.1

3. Methods

Based on the above materials,model was preliminarily built as :Y= C+ C_1*X_1+ C_2*X_2+ C_3*X_3+ ε .After getting the estimators of model parameter, an econometric model had been preliminarily established, but it remained to be seen whether the model can objectively reveal the relationship between factors in the economic phenomena. Therefore, the next step was model test, including economic significance test, statistical tests, econometric test and model prediction test.this paper used EVIEWS 3.1 for parameter estimation, model test and model modification.

Model modification mainly used the method of stepwise regression in this paper.The basic idea of stepwise regression is to introduce variable models into the model one by one. After the introduction of one variable, the model should be tested with F test, and elected variables should be tested with T test one by one. If the previous explanatory variable is no longer significant due to the introduction of the next explanatory variable, the previous one should be deleted from the model, in this way ensuring that regression equation contains only significant variables before introducing a new variable. This is an iterative process to ensure to get optimum explanation variables, until there are no significant explanatory variables being selected into the regression equation and no significant explanatory variables being removed from the regression equation[9].

Based on the above ideas, stepwise regression can be used to filter and eliminate variables that result in multicollinearity. Specific steps are as follows: firstly doing simple regression between explained variables and each explanatory variable, then on the basis of the corresponding regression equation of the explanatory variable which contributes most to explained variable, introducing rest variables one by one. Through stepwise regression, it makes sure that final equation reserves important variables and has no serious multicollinearity[10].

4. Results

4.1 parameter estimation

Through EVIEWS 3.1, the model was preliminarily estimated, as follow:

$$\hat{Y}_i = 469.3652 + 1.7884X_1 + 0.7215X_2 - 8.8007X_3$$

$S.\hat{E}(\beta)$ (250.8966) (2.2105) (0.01904) (4.8007)

t (1.8708) (0.6090) (37.8879) (-1.83332)

R^2=0.9983; $\overline{R}^2$ = 0.9980; DW=1.0545; F=3194.701; $\hat{\sigma}$ =48.4463; p (f) =0.00000

4.2 model test

With regard to the goodness of fit test and significance testing, the significance level was set to be 0.05 in this paper. The value of R^2 is equal to 0.9980, closing to 1, showing that model has a high goodness of fit; F=3194.401$\rangle F_\alpha(3-1,20-3)=$ 3.59, showing that the model has a significant linear relationship, or Rural Consumer Price Index, per capita disposable income of rural residents, Engel Coefficient of rural households have a jointly significant influence to the consumption level; the T value of Rural Consumer Price Index is 0.6090,less than the value of $t_{\alpha/2}(20-3)$ that is equal to 2.110,showing that Rural Consumer Price Index does not significantly affect the consumption level; the T

value of per capita disposable income is 37.8879,more than the value of $t_{\alpha/2}(20-3)$ that is equal to 2.110,showing that per capita disposable income has a significant influence to the consumption level; the T value of Engel Coefficient is 1.8333,lower than the value of $t_{\alpha/2}(20-3)$ that is equal to 2.110,showing that Engel Coefficient has no significant influence to the consumption level.

In terms of economic sense, assuming that other explanation variables remains unchanged, the model shows that when Rural Consumer Price Index rises by 1%, rural residents' consumption level will increase by 1.7884 yuan; when rural residents' per capita disposable income rises by 1%, rural residents' consumption level will increases by 0.7215 yuan; when Engel Coefficient rises by 1%, rural residents' consumption level will decrease by 8.007 yuan.

Considering there are three explanation variables in the model, test for multi-collinearity is necessary to find out if correlation exists among explanation variables. Multicollinearity will lead to the distortion of parameter estimation. Through related-coefficient test, it shows that explanatory variables are related to rural residents' consumption level, and there exists pairwise correlation among variables, so next step was to modify the model.

4.3 model modification

According to the principle of stepwise regression, Rural residents' per capita disposable income should be the main factor that influence rural residents' consumption level, and the correlation coefficient test also shows that rural residents' per capita disposable income has the strongest relevance with rural residents' consumption level, so, $Y= C+ C_2*X_2 + \varepsilon$ was set as basic model.

After introducing other rest explanatory variables one by one, final model of rural residents' consumption level was determined as follow:

$$Y= 529.0466 + 0.7277X_2 - 6.5794X_3$$
$$(237.3581)\ (0.0173)\ (3.8978)$$
$$T = (2.2289)\ (42.1161)\ (-1.6880)$$

R^2=0.9982; $\overline{R}^2$ =0.9981; F=4891.113; S.E=48.1674; D.W=1.0281; p(f)=0.0000

The value of R^2 is equal to 0.9981, closing to 1, showing that model has a high goodness of fit; the value of F is equal to 3194.401, more than the critical value that is equal to 4.41, showing that the model has a significant linear relationship, or per capita disposable income of rural residents and Engel Coefficient of rural households have a jointly significant influence to the consumption level. On the other hand, its P value is 0.000000,obviously less than the significance level of 0.05, showing that each variable has a significant influence on rural residents' consumption level Y and linear relation is obvious in the model; the T value of per capita disposable income is 42.1161,more than the critical value of 2, showing that per capita disposable income has a significant influence on the consumption level; the T value of Engel Coefficient is lower than 2,showing that Engel Coefficient has no significant influence to the consumption level.

In terms of economic sense, assuming that other explanation variables remains unchanged, the model shows that when Rural Consumer Price Index rises by 1%, rural residents' consumption level will increase by 1.7884 yuan; when rural residents' per capita disposable income rises by 1%, rural residents' consumption level will increases by 0.7277 yuan; when Engel Coefficient rises by 1%, rural residents' consumption level will by 6.5794 yuan.

5. Discussions and Conclusions

This paper was to study what factors that makes difference to the consumption level of rural residents in China. According to some Economic theories, three affecting factors were chosen as explanatory variables: Rural Consumer Price Index, per capita disposable income of rural residents, Engel Coefficient of rural households. Then this paper used EVIEWS 3.1 for parameter estimation, model test and model modification. Model test included economic significance test, statistical tests, econometric test and model prediction test in this paper, and model modification mainly used the method of stepwise regression. After introducing explanatory variables one by one, Rural Consumer Price Index was deleted from the model, and final model of rural residents' consumption level was determined as follow: Y= 529.0466 +0.7277X2 - 6.5794X3.Final model estimation results shows that when rural residents' per capita disposable income increases by 1 yuan, rural residents' consumption level will increase by 0.7277 yuan; when the Engel Coefficient of rural households rise by 1%, rural residents' consumption level will decrease by 6.5794 yuan.

Based on these conclusions, this paper would like to put forward some suggestions to improve

rural residents' consumption level from following aspects.

On the one hand, the core of the issues concerning agriculture, countryside and farmers is how to increase farmers' income. Only on the premise that farmers' income increases can standard of peasants' lives fundamentally improve, as well as their consumption level. As agricultural income is still the main part of farmers' income, especially in the central and western regions, agricultural income is still the basis of farmers' income growth [11]. In order to realize steady growth of farmers' income, it is necessary to perfect the support and protection system offered by government for agriculture. For example, government can make more efforts to deepen rural reforms, perfect policies to aid agriculture and benefit farmers, improve farm produce price forming mechanism and agricultural subsidies and strengthen the financial service. Also, it is important to unswervingly speed up the transformation of the mode of agricultural development to realize agriculture modernization. Of course, increasing farmers' income is not just limited to consider increasing, but also reducing farmers' spending like expenditures for education, medical treatment and so on, which is also a kind of effective way to increase income. Therefore, government should vigorously develop rural education, health and other social undertakings.

On the other hand, improving rural residents' consumption structure is also an aspect to improve rural residents' consumption level [12]. To achieve this, Firstly, strengthen rural consumer education and change rural residents' consumption concept .Rural residents' consumption concept is relatively backward, which is an important factor that affects the upgrading of their consumption structure.so, it is necessary to through the propaganda education change rural residents' consumption ideas and cultivate their good habits of consumption. Secondly, expand the consumer area. Short power supply, inconvenient traffic, poor commodity circulation and bad market order have always been preventing rural residents' consumption structure from upgrading. Government should further increase investment in agricultural and rural infrastructure, improving the infrastructure of rural production and living, especially in the areas of merchandise trade, culture, sports, travel, broadband network and other infrastructure constructions, to promote cultural consumption, tourism consumption and Old - Age consumption.

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SECTION 22. Policy. Innovations. Theory, practice and methods.

SOME ASPECTS OF REVEALING OF THE POLITICAL MODERNIZATION PROCESSES IN UZBEKISTAN

Abstract: *In given article the state of the political modernization in Uzbekistan is analyzed, also some aspects of the processes of the political modernization in our country are considered.*

Key words: *modernization, political modernization, liberalism, democracy, president, parliament, reforms.*

Language: *Russian*

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НЕКОТОРЫЕ АСПЕКТЫ ПРОЯВЛЕНИЯ ПРОЦЕССОВ ПОЛИТИЧЕСКОЙ МОДЕРНИЗАЦИИ В УЗБЕКИСТАНЕ

Аннотация: *В данной статье анализируется состояние политической модернизации в Узбекистане, а также рассматриваются некоторые аспекты процессов политической модернизации в нашей стране.*

Ключевые слова: *модернизация, политическая модернизация, либерализм, демократия, президент, парламент, реформы.*

Третье тысячелетие в истории человечества началось с невиданных преобразований. Эта эпоха, именуемая техногенной цивилизацией, примечательна с одной стороны, подъемом развития общества на новый уровень через совершенствование техники и технологий, а с другой стороны тем, что сформирован новый подход в сознании человека к совершенствованию общества. Это характеризуется изменением стабильного развития общества, способа управления, обновлением межгосударственных и межнациональных отношений, а также необходимостью обновления человеческого существования, быта и жизнедеятельности в процессе модернизации.

Сформулированная в 50-60-е годы XX века модернизация имеет многогранную, сложную систему понятий, в составе которой политическая модернизация (англ. modernization) занимает особое место. Политическая модернизация означает создание и осуществление приемлемых политических механизмов для укрепления демократических основ развития гражданского общества исходя из требований и запросов времени, совершенствование отношений в русле современности государства и общества.

Современные концепции политической модернизации нашли своё отражение в анализе таких учёных, как Г.Алмонд, С.Верба, У.И.Робинсон, М.Мандельбаум, Э.Арато, Р.Ингелхарт, Г.Дарендорф, Ф.Хайк, Л.Болцерович, Л.Пай, С.Хантингтон, Д.Дариндорф, Р.Даль, Ф.Фукуяма, М.Крозе, Э.Гидденс, М.В.Илин, М.Иноземцев, Д.Дроботун, А.Кавата.

Наравне со сформированными во второй половине XX века консервативным и либеральным направлениями политической модернизации, стремительно развивался новый тип демократической модернизации, выражающий последовательную политическую стабильность общества.

По мнению представителей либерального направления политической модернизации, процесс углубления демократизации общества является приоритетной основой модернизации и это характеризуется: созданием современного суверенного государства; созданием дифференцированной политической системы;

усилением роли государства в законодательстве и законотворчестве и обеспечении верховенства закона; увеличением политической активности граждан и их участия в политической жизни общества; подъемом роли представителей политической элиты, служащих политической модернизации.

Также представители данного направления выделяют следующие типы политической модернизации:

- эндогенный (политическая модернизация осуществляется только на основе социально-политической деятельности самого общества);
- эндогенно-экзогенный (политическая модернизация осуществляется на собственной основе, равно как и на основе опыта других стран);
- экзогенный (политическая модернизация осуществляется не на собственной социально-политической основе, а на заимствовании опыта других стран) [5].

В частности, Самуэль Хантингтон утверждает, что политическая модернизация состоит в демократизации сознания общества, процессы модернизации общественной, экономической, научной, культурной, образовательной сфер в конечном итоге приведут к демократизации общества, а в ходе политической модернизации положение политической стабильности будет иметь весьма важной значение. По его мнению, «Сохранение политической стабильности во многом связано с темпом развития экономики общества, правильным распределением доходов, наличием запасов политических возможностей, эффективностью деятельности политических партий» [6].

По мнению Р.Даля и Г.Алмонда политическая модернизация выражается активностью политического мышления населения вкупе с образованием открытой демократической политической системы. Они отводят ведущую роль в процессе политической модернизации самобытному виду демократии – полиархии, то есть, политической системе, обеспечивающей участие широких масс населения на высоком уровне в политических преобразованиях.

Концепция процессов политической модернизации в Узбекистане за годы независимости теоретически и методологически была четко определена и обоснована Президентом Республики Узбекистан И.Каримовым на основе глубочайшего анализа мирового опыта. В концепции определены научные критерии основ, подходов, целей и задач последовательной модернизации страны.

По сути, модернизация страны есть соблюдение пяти принципов социально-экономического развития, а именно: обеспечение приоритета экономики над политикой, ее беспристрастности к идеологии, обеспечение государством в качестве главного реформатора верховенства закона и равноправия граждан, сильной социальной политики и социальной защиты, учет национального менталитета в последовательном и поэтапном переходе к рыночным отношениям. Модернизация нашей страны – это последовательная реализация реформ на основе «узбекской модели» и их логическое развитие.

В ходе модернизации в Узбекистане соблюдается принцип «От сильного государства – к сильному гражданскому обществу». Особыми сторонами данной модели являются логическая последовательность, транспарентность, социальный прогноз, невозвращение назад и окончательность. Опыт развитых стран показывает, что если реформы во всех сферах не объединены едиными целями и задачами, то модернизация приведет к разрозненности.

Конечная цель принципа «От сильного государства – к сильному гражданскому обществу» - выведение на первейшее место усиления роли граждан в управлении государством путем осуществления реформ в социально-экономической, социально-политической модели государственного и общественного строя. Это означает, что на деле нужно совершенствовать всю систему институтов гражданского общества, интегрирование его управления к административно-региональным подразделениям в унисон со всей страной.

Осуществление и внедрение данной концепции в новых условиях означает отделение управления от зависимости центра и упорядочение комплекса законодательных и правовых документов, направленных на передачу части полномочий от центра к органам местного управления и самое важное – усиление роли и значения органов местного самоуправления – махаллей, махаллинских комитетов и сельских советов; особо важно усиление роли и влияния политических партий и гражданских институтов в принятии государственных решений.

Осуществляемые в Узбекистане процессы политической модернизации по своей сути всецело направлены на создание для народа условий свободной, благоустроенной и благополучной жизни путем установления современного гражданского общества. Все реформы направлены в пользу политики преобразований и модернизации.

На первоначальном этапе процессов политической модернизации были осуществлены политико-правовые мероприятия, направленные на реформирование системы государственного управления в стране в соответствии с современными демократическими требованиями,

а также на усиление эффективности ее работы. В ходе данных процессов было уделено особое внимание совершенствованию институциональных основ демократизации общества, дополнению соответствующим содержанием деятельности созданных политических структур. Была искоренена старая административно-командная система. На основе перераспределения полномочий органов государственного управления были созданы основы национальной государственности. В этом государство сыграло роль главного инициатора процессов модернизации.

На совместном заседании Законодательной палаты и Сената Олий Мажлиса в январе месяце 2005 года И.А.Каримов в своем выступлении подробно изложил теоретические и практические основы организации в нашем обществе политической модернизации, развития на этой основе гражданского общества путем обновления и приведения в соответствие с реальными условиями правовых, институциональных, политических основ:

- важнейшая задача в сфере государственного строительства и управления - усилить роль и влияние законодательной власти - парламента страны, добиться более сбалансированного и устойчивого равновесия между законодательной, исполнительной и судебными ветвями власти.

- передача части полномочий Президента верхней палате парламента - Сенату и правительству, формирование профессиональной, работающей на постоянной основе нижней Законодательной палаты, расширении ее полномочий и прав.

- усиление роли и вместе с тем ответственности Премьер-министра и в целом правительства страны.

- осуществление конкретных законодательных мер по укреплению самостоятельности и независимости судебной власти;

- реформирование парламентской системы, повышение качества принимаемых законодательных актов наряду с обеспечением сбалансированности общегосударственных и региональных интересов, расширение масштабов широкого участия институтов гражданского общества в государственном и общественном управлении.

В результате реализации принятого в 2007 году Конституционного Закона Республики Узбекистан “Об усилении роли политических партий в обновлении и дальнейшей демократизации государственного управления и модернизации страны” были созданы условия для расширения полномочий законодательного органа власти – Олий Мажлиса и местных кенгашей, обеспечения независимости исполнительного органа власти – правительства, внесения изменений в полномочия и функции Президента, создана возможность их сокращения. В связи с этим была достигнута сбалансированность и устойчивое равновесие между отраслями власти.

На основе выдвинутых Президентом ранее идей началось осуществление устойчивых процессов дальнейшей либерализации деятельности и институционально-правовых основ ведущей основы формирования в стране гражданского общества – парламента.

Обоснованные Президентом идеи либерализации государственного строительства и управления имели решающее значение в ходе осуществляемых в стране процессов политической модернизации. В результате осуществленных на основе этих идей социально-политических реформ были заложены прочные фундаментальные основы развития институтов демократии и гражданского общества. В частности, были созданы механизмы устойчивого баланса, взаимоконтроля и разграничения между законодательной, исполнительной и судебной отраслями власти, которые являются важным гарантом формирования гражданского общества. Причем данные механизмы были созданы на основе опыта демократических государств. Эти механизмы были отражены в Конституции и законах страны. В ходе данных процессов было уделено особое внимание углублению реформ парламентской сферы.

Осуществляемые реформы в области формирования в Узбекистане двухпалатного парламента можно видеть в качестве нового этапа демократического развития и логического продолжения политики либерализации всех сфер общественной жизни.

Президент Республики Узбекистан И.А.Каримов 27 января 2010 года в своем докладе “Модернизация страны и построение сильного гражданского общества – наш главный приоритет” на совместном заседании палат вновь избранного Олий Мажлиса были выдвинуты новые идеи по актуальным вопросам в сфере государственного строительства и управления, задачам в области демократического развития и совершенствования деятельности законодательной власти. В том числе было уделено особое внимание вопросам совершенствования законотворческой деятельности Законодательной палаты, дальнейшему развитию институтов парламентского контроля и депутатского запроса, активизации партийных издательств, увеличению ответственности парламента в обеспечении стабильности и безопасности страны, а также вопросам дальнейшего усиления роли

существующих в нашей стране политических партий в парламентской жизни и самое важное – в осуществляемой в обществе либерализации и модернизации. На основе данных идей Президент Республики Узбекистан И.А.Каримов 12 ноября 2010 года в своем докладе на совместном заседании палат Олий Мажлиса Республики Узбекистан "Концепция дальнейшего углубления демократических реформ и развития гражданского общества в нашей стране" отметил основные направления политической модернизации.

На основе концепции дальнейшего углубления демократических реформ и развития гражданского общества в стране было выдвинуто требование разработки и принятия документов о правовых механизмах, направленных на усиление роли органов юстиции в обеспечении соблюдения законности и верховенства закона в деятельности органов государственного управления, правоохранительных структур, в том числе прокуратуры. Обеспечение органов юстиции необходимыми полномочиями для увеличения их роли в проведении единой государственной политики в области законотворчества и соблюдения прав предоставило возможность создания эффективного механизма баланса и сдержек в системе правоохранительных и надзорных органов. Это, в свою очередь, послужило обеспечению законности и верховенства закона в деятельности данных органов.

Эти направления нашли своё отражение в принятых в последние годы законах "Об экологическом контроле", "Об общественном контроле", "Об обеспечении открытости деятельности органов государственной власти", "О независимости судов", "Об электронном правительстве", "О социальном партнёрстве" и других нормативно-правовых документах. Сегодня эти законодательные и нормативно-правовые документы последовательно внедряются на практике.

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SECTION 30. Philosophy.

VIEWS OF AL-FARABI ON THE CIVIL SOCIETY DEVELOPMENT

Abstract: *In this article some interest moments and concepts of the Farabi doctrine about civil society and origins of democracy are considered.*

Key words: *Al-Farabi doctrine, legal consciousness, philosophy of law, virtuous state, social life, people.*

Language: *English*

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The ideological legacy of the past, as part of civil consciousness, is an essential component and an indicator of the maturity of civil society, and today it has received the current sound in our independent state. Therefore, the study of the historical background of its formation is of practical value. In this regard, the President of the Republic of Uzbekistan Islam Karimov said: "We need to take from the past only what is today exalts people, lifts us up in his eyes. This humanistic principle that allows our nation, our people feel themselves confident in the community. However, the second thing that must be associated with it - is a constant desire to explore the height of the world of science and thought" [1, page 253].

Philosophy as a form of social consciousness, covers various areas of activity, such as science, art, economics, finance, etc. One such important spheres of activity, which is engaged in the study of philosophy is right.

The philosophy of law - is a branch of philosophy and jurisprudence, which studies the law, the spirit and concept of its place in the world, its meaning and value of human life, society and the State.

The study of the legal issues involved in more ancient philosophers, such as Socrates, Democritus, Plato, Aristotle, and others. Known and different legal doctrines of medieval philosophers of the West and the East. Among the representatives of the western medieval philosophy can be called Augustine, Thomas Aquinas, Marsilius of Padua and others. Legal Eastern philosophy teachings of this era such as Abu Nasr Farabi, Abu Rayhan Biruni and Ibn Sina allow a better understanding of the legal ideology of the East, the main stages of its development. Their artistic heritage is not lost its relevance even today.

One of the brightest representatives of a galaxy of personalities IX –XII is Abu Nasr al-Farabi - the largest representative of the medieval Eastern philosophy, mathematics, music theorist, who made a huge and invaluable contribution to the development of world science, influenced the world of Ibn Sina, Omar Khayyam, Roger Bacon, Leonardo da Vinci and others.

Abu Nasr al-Farabi was born in 870 in Farab city, situated on the Syr Darya River where it meets the river Arys, and lived in Shash (now Tashkent) and studied at Bukhara, Samarkand. At the beginning of the tenth century, the desire for knowledge led him to the capital of the Arab Caliphate of Baghdad. There, he met with various fields of knowledge, studying languages. It is known that he was a polyglot and the legend knew 70 languages. Farabi was persecuted for progressive ideas expressed in the book "The book of views of the inhabitants of the ideal city" and was soon forced to leave Baghdad.

Al-Farabi was a connoisseur of the Hellenistic culture. Widely known for his commentary on the works of Aristotle. In addition, he made a great contribution to the development of logic. Due to this it during his lifetime he was awarded the honorary name "Aristotle of the East", the "Second Teacher".

In his state-legal concept Farabi advances its own concept of the origin of society and presents his project of an ideal society (city-state). [2] He argues that "by its very nature each person is designed so that for their own existence and to achieve the highest perfection it needs a lot of things that he can

not deliver himself alone and to achieve that it needs a certain community of people who deliver it separately every thing any of a plurality of what he needs. In addition, each person in relation to another is exactly in the same position. That's why only through the union of many people helping each other, where each gives the other a certain fraction of what is necessary for its existence; a person can attain the perfection to which it is intended by nature. The activity of each member of the community in their totality gives each one of them all that what he needs for the existence and achieve excellence. "

Farabi leading classification society: great (the union of all people, the peoples inhabiting the land), average (society of certain people) and small (an association of people in some cities). City-states, he falls into the virtuous, collective and ignorant [2]. For the original in this division he takes the moral categories of good, evil, attitude to work.

The virtuous state strives to achieve true happiness to all people, there is dominated by goodness and justice, and condemned the evil and injustice.

The social life of the virtuous city-state built on the principles of high morality of people who help each other attain true happiness. Studying the goals and build a virtuous state, he drew attention to the social structure of society.

Population virtuous state is divided into five layers [2]:

1) sages and other worthy persons;

2) "religious people", poets, musicians, scribes;

3) accountants, geometricians, physicians, astrologers, etc.;

4) warriors - warriors, guards, etc.;

5) rich people, farmers, ranchers, merchants, etc. All these segments of the population virtuous States are bound by ties of friendship, mutual interests, fair attitude to each other.

The head of the virtuous city is a philosopher-ruler, able to know the beginning of controlling nature and society, and to transfer this knowledge to the public.

Farabi believes that the first chapter - is one on which absolutely no one has power. He is the ruler of all people in all parts of the well-ordered world. The key to its superiority over the other are 12 features, among which are the natural and spiritual qualities. They are:

- Health and lack of defects;
- The ability to properly understand the reality and the wishes of others;
- Lovely memory; and the presence of mind and ingenuity;
- Oratorical skills;
- Interest in science and the pursuit of their development;
- Refusal of vulgar life and indulging fleshly lusts;
- Love the truth and truthful people, and hatred with lying and deceitful men;
- Love of nobility and honor;
- Contempt for riches and luxury;
- Justice and love for it, as well as the struggle against injustice and unjust people;
- Moderation, but not passive;
- Determination, courage and bravery in committing meritorious deeds and avoid displays of weakness. [2]

Particularly important is the factor that the Farabi defined the utopian city "utopian city - this is the city where people live together in order to cooperating with each other, to achieve true happiness." Happiness has two bases: first - this knowledge, and the second - the action. Speak the truth, happiness and kindness, as well as the knowledge and the choice of the means that lead us to happiness. And the voluntary application of effort to achieve this goal. This - what we should do all citizens of a utopian city. The first chapter is exceptional in that it is reunited with the higher world, and thanks to it, has reached the truth, has the strength and the dignity required in order to pass this way, and to show it to others. The head is both the reason for the existence of the city, as well as his character. All good citizens of the city should be given knowledge and will, but at the same depth of knowledge can not all be the same. Each endowed with these qualities is worthy of being the first head of the ruler and guide society. However, due to the fact that you have all these qualities in one person is problematic, then find such a person is difficult. Such people are a unit. If it happens that in some time it will be impossible to find such a person, then the output is to apply the laws and regulations submitted by such an outstanding person in the past. Thus, inevitably the case of board pass into the hands of the second chapter, which is also the guardian and the executor of the laws and traditions of the first chapter.

There is another question: what to do if once all these qualities can not be found in one person? Farabi says: "If you can not find one person, endowed with all these qualities, and there are two - one a philosopher, and the second is the quality of the other, both can be heads. Also, if all of these six conditions are divided among six or group of people, and all they are able to agree with each other, then everyone can be good at the same time the rulers of society. "

Virtuous Farabi State opposes the ignorant state, which does not seek to nothing, the rulers and the people have no idea about the true happiness and only focus on the pleasures and riches, are mired in lies, slander and arrogance.

In conclusion, I would like to emphasize that Abu Nasr al-Farabi made an enormous contribution to the world of jurisprudence and because of its

philosophical and legal doctrine is of great interest, both for the modern philosophers and modern jurists, and detailed study it is possible to enrich existing philosophical and legal theories.

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SECTION 21. Pedagogy. Psychology. Innovations in the field of education.

SOCIO-ECONOMIC IMPORTANCE OFEDUCATIONAL SYSTEM DEVELOPMENT IN KAZAKHSTAN

Abstract: *An analytical overview of the current state and prospects of educational system development in the Republic of Kazakhstan was made., the author's model of forecasting specialists training technique was offered.*

Key words: *educational system, sector, competitiveness, specialists, information.*

Language: *Russian*

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СОЦИАЛЬНО-ЭКОНОМИЧЕСКАЯ ЗНАЧИМОСТЬ РАЗВИТИЯ СИСТЕМЫ ОБРАЗОВАНИЯ В КАЗАХСТАНЕ

Аннотация: *Проведен аналитический обзор современного состояния и перспектив развития системы образования в Республике Казахстан., предложена авторская модель методики прогноза подготовки специалистов.*

Ключевые слова: *система образования, отрасль, конкурентоспособность, специалисты, информация.*

Современное состояние системы образования, связанное с рыночными отношениями, требует выработки новых подходов к проблемам подготовки и трудоустройства выпускников высших учебных заведений, овладение более универсальными профессиями, пользующимися спросом на рынке труда.

Возникает необходимость сосредоточения усилия на развитии такой системы образования, которая, с одной стороны, быстрее реагирует на изменения спроса, а с другой стороны – учит людей самостоятельно мыслить и приспосабливаться к изменяющимся условиям рынка.

Общеизвестно, что положение стран в современном мире определяется интеллектуальным и образовательным потенциалом.

Социально-экономические показатели являются определяющим фактором развития человеческого капитала страны. В Казахстане ВВП как один из ключевых количественных показателей темпов и уровня экономического развития страны характеризуется положительной динамикой в номинальном выражении.

Инвестирование сферы образования приносит значительные экономические выгоды, которые, несомненно, в несколько раз превышают затраты.

Качественный потенциал человеческого капитала страны предопределяет конкурентоспособность государства и во многом зависит от эффективности функционирования системы высшего и послевузовского образования.

В 2013-2014 году в общий список рейтинга QS вошли 800 университетов 76 стран мира. Лигу ведущих мира возглавил Массачусетский технологический институт, Гарвардский университет, Кембриджский университет. Далее следуют Университетский колледж Лондона, Имперский колледж Лондона, Оксфорд, Стэндфордский, Йельский университеты, Университет Чикаго, а также Калифорнийский технологический институт и Принстонский университет.

В топ-800 лучших вузов мира по версии британского исследовательского агентства QS вошли 8 учебных заведений Казахстана.

Уровень квалификации специалистов является сегодня одним из наиболее важных факторов, определяющих уровень развития экономики страны.

В настоящее время в экономике Казахстана отсутствует единый общепринятый показатель, который свидетельствовал бы о недостатке или перепроизводстве специалистов с высшим профессиональным образованием. Возникает необходимость научно обоснованное определение потребности экономики и социальной сферы в специалистах с высшим профессиональным образованием, т.е. на основе конкретной методики определения.

Подготовка специалистов определяется многими факторами, в числе которых: прогноз развития науки и техники, перспективы развития отдельных отраслей экономики, изменение демографической ситуации, экономические и финансовые возможности государства, социальные последствия массовой подготовки специалистов. Основой для прогнозирования потребности в специалистах является прогноз развития отраслей и регионов: расчеты должны опираться на соответствующие показатели развития (объем производства, транспортировки, производительности труда), расширение действующих предприятий и организаций, потребности в рабочих кадрах, с ожидаемыми изменениями в качественном составе специалистов, их квалификации.

Анализ публикаций в области образования показал, что образование как сфера экономической деятельности и его роль и значение в социально-экономическом развитии страны исследуются в публикациях казахстанских ученых Adambekova A.A., Amankeldi N.A. (2015), Кулекеев Ж.А. (2015), Aliyev U., Kurmanov N (2015), Шалабаева Ш.Е. (2012) и другие, которые проводили исследования ключевых характеристик текущего развития системы профессионального высшего образования в Казахстане и факторы, снижающие качество образовательных услуг.

Ученые-экономисты зарубежных стран исследовали всесторонне систему образовательных услуг, так Zgalat-Lozynska L.A. (2015) рассматривает необходимость совершенствования деятельности по профессиональной ориентации в Украине в сравнении с США с учетом организационно-правовых методов. Rajiv Shah, Zhijie Gao and Harini Mittal (2015, Sharma P. (2012) занимаются исследовательской деятельностью в области инновационного развития общества на региональном уровне. Вопросы трудовых ресурсов в России рассмотрены в трудах ученых Сухарева О.С. (2016), Павлова Б.С. (2015), Рубинной Ю.Б. (2005) и других.

Несмотря на имеющуюся значительную теоретико-методологическую базу, проблема системного повышения эффективности и конкурентоспособности системы образования в Казахстане является слабо изученной и создает широкие возможности для авторских новаций, теоретического осмысления и методологического обоснования.

Система образования должна передавать не только знания, но и необходимые навыки, а также постоянно внедрять современные методы обучения и активно использовать новейшие технологии.

В основе качественных сдвигов, происходящих в современной образовательной отрасли, лежит инновационная направленность стратегии и тактики развития образования. Изменения факторов развития образования выражаются в возрастании их информационной, интеллектуальной и информационной составляющих. Эти тенденции тесно связаны с трансформацией форм и методов организации субъектов образовательной деятельности и управления ими.

Использование Методики по прогнозированию потребности экономики в специалистах в нашей стране имеет определенные в специалистах в нашей стране не имеет определенные трудности в связи со сложностью прогнозирования производительности труди и ожидаемого выпуска продукции отраслей экономики. На прогнозирование негативно влияет также недостоверность и низкое качество информации, несовершенство методов прогнозирования и т.д.

При прогнозировании необходимо сбор исходной информации в частности о профессиональной структуре занятых в различных отраслях проводить не один раз в 10 лет, а из результатов обследований, проводимых каждые три года, что даст возможность оперировать более свежими данными. Также сложность использования методики определения потребности в специалистах объясняется тем, что методика прогнозирования используется для экономики стабильного развития, когда промышленность развитых стран имеет высокий технологический уровень и достаточно устойчивый цикл развития.

Для расчетов используется информация, полученная в результате анализа и прогноза из перечня профессий, по которым осуществляется подготовка квалифицированных специалистов, представленных в соответствующих образовательных стандартах. Особую ценность она представляет для определения перспектив

выпуска уже принятых студентов со сроками обучения от 2 до 5 лет, а также принятых в текущем году, выпуск которых намечен в последующие годы. В последнем случае имеется реальная возможность повлиять на состав профессий в целях реального согласования его с будущим рыночным спросом на соответствующие профессии и принимать решения о диверсификации (перепрофилировании) деятельности высших учебных заведений.

За основу расчета принимается балансовая модель спроса и предложения специалистов с высшим образованием по каждой специальности на региональном рынке (j-индекс региональной единицы) на прогнозируемый год (t-индекс года). В дальнейшем при записи модели индексы j и t опускаются для того, чтобы не нагромождать формулы.

Балансовая модель спроса Si и предложение Pi специалистов i-й специальности с высшим образованием (ВО) на региональном рынке труда на прогнозируемый год имеет вид:

$$Si=Pi\pm Xi \quad (1)$$

где +X –неудовлетворенный спрос; образуется при Si>Pi;

-Xi - нереализованное предложение; образуется при Si<Pi.

Потребность в специалистах с ВО i-й специальности Si состоит из двух составляющих:

$$Si=SiB+Si3, \quad (2)$$

где SiB - спрос на специалистов с ВО на свободные вакантные места, (вновь создоваемые рабочие места). Прогноз на вакантные должности устанавливается организациями незавмисимо от форм собственности в результате анализа перпектив развития производства, планируемых к внедрению технологий нововведений, совершенствования уже функционирующих призводственных процессов, совершенствования организационных струтур управления и др. Si3 – спрос на специалистов с ВО на замену специалистов с ВО, выбывающих по разным причинам (всего, без детализации по причинам).

Этот показатель на прогнозную перспективу устанавливает ресчетным путем, исходя из численности занятых специалистов i-й специальности и коэффициента выбытия специалистов:

$$Si=Чi3*I, \quad (3)$$

где Чi3- численность занятых специалистов i-й специальности

I - Коэффициент выбытия специалистов i-й специальности. Определяется на основе экономического прогноза или методом экстраполяции.

Предложение специалистов с ВО i-й специальности Pi состоит из следующего множество слагаемых:

$$Pi= Mi+Ni+Fi+Li-Li'+Ki-Ki'+Bi, \quad (4)$$

где Mi - молодые специалисты-выпускники ВУЗов i-й специальности по гос. заказу, в т.ч. по гранту и кредиту (1-е высшее образование); Ni – безработные с ВО i-й специальности; Fi – специалисты с ВО i-й специалисты из категории самостоятельно занятых , но желающих работать по специальности; Li− механический приток специалистов с ВО i-й специальности; Li′− выбытие специалистов с ВО i-й специальности по разным причинам, в т.ч. уволенные по собственному желанию;

Ki- уволенные из рядов Вооруженных сил РК с ВО i-й специальности; Ki′−молодые специалисты, призванные в ряды Вооруженных сил РК;

Bi- специалисты, получившие 2-е высшее образование по i-й специальности.

Примечание: Показатели Li *и* Ki *по логике не относятся предложению. Но вычитание их из правой части баланса позволит вести более достоверной учет по составляющим (правая часть баланса) и* Mi *(левая часть баланса).*

Исходная информация предварительно обрабатывается с целью пригодности в формуле баланса и далее заносится в соответствующие таблицы. Далее составляются сводные таблицы, по форме отражающие общее положение по спросу и предложению в разрезе специальностей по республике (число таких таблиц равно числу специальностей) и одна сводная таблица, отражающая общее положение рынка труда РК.

Предлагаемая методика оценки инновационной активности вуза позволяет поэтапно углублять оценку объекта исследования.

Этап 1. Применение формального подхода к оценке инновационной активности. На данном этапе выявляется принадлежность вуза к категории инновационно активных и анализируется видовая структура его инновационной деятельности.

Этап 2. Применение ресурсно-затратного подхода к оценке инновационной деятельности вуза путем расчета следующих критериев:

- доля профессорско-преподавательского состава и научных сотрудников с учеными степенями, занятых инновационной деятельностью, в среднесписочной численности;
- доля стоимости основных фондов, эксплуатируемых в процессе инновационной деятельности, в средней стоимости основных фондов вуза;

- удельный вес инновационных затрат в выручке от реализации образовательных услуг;
- инновационные затраты в расчете на одного работающего в вузе.

Этот этап дает характеристику ресурсной составляющей инновационного потенциала и позволяет оценить инновационную активность вузов, ещё не получивших явных экономических выгод от инновационной деятельности.

Этап 3. Применение результативного подхода к оценке инновационной активности. В зависимости от вида внедряемых инноваций может быть осуществлена стоимостная оценка таких эффектов инновационной деятельности как экономия затрат и вклад в рыночную стоимость бизнеса.

Если целью исследования является сравнительный анализ нескольких вузов по критерию инновационной активности, то в методику может быть введен дополнительный *4-й этап:* комплексная оценка инновационной активности.

Существуют различные методы комплексной оценки. Инновационный потенциал вуза может быть оценен как значительный при условии, что вся продукция, им производимая, востребована потребителями. Чем меньше уровень востребованности, тем ниже уровень инновационного развития. Научно-техническая продукция, произведенная, но не востребованная, не изменяет фактических размеров инновационного потенциала хозяйствующего субъекта. Это в полной мере можно отнести и к выпускникам вуза.

Методика оценки инновационного потенциала вуза основана на выделении инновационной составляющей во всех сферах его деятельности

На рисунке 1 показан графический метод построения интегрального показателя. Площадь образовавшегося многоугольника отражает уровень текущей инновационной активности вуза

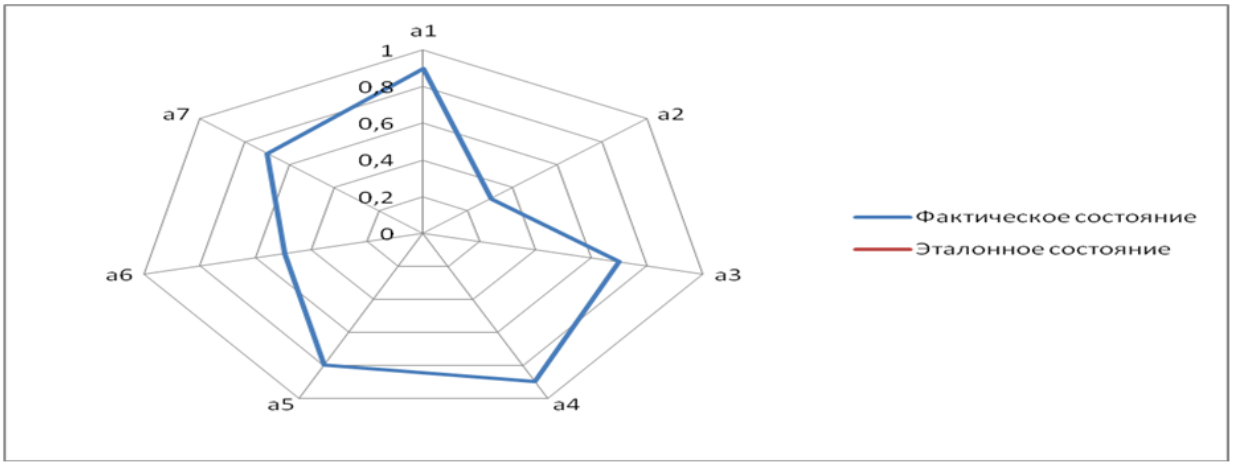

Рисунок 1 - Графический метод построения интегрального показателя.

Оценку инновационного потенциала вуза проводят с целью определения достаточности у него финансово-экономических ресурсов для обеспечения не только инновационной, но и текущей деятельности. А это в свою очередь связано с формированием основного и оборотного капитала, привлечением собственного и заемного капитала. В практике финансового анализа такая задача решается в процессе оценки обеспеченности запасов различными источниками их формирования (собственными оборотными средствами, долгосрочными и краткосрочными кредитами).

Оценка инновационного потенциала вуза в первую очередь связана с анализом его финансовой устойчивости к инновационному развитию.

Высшей школе Казахстана предстоит провести большую работу в аспекте эффективности проводимых мероприятий по повышению качества образования и международной узнаваемости вузов на мировом рынке образовательных услуг. Результаты ранжирования в определенной мере служат ключевыми ориентирами социально-экономического развития республики.

Таким образом, обобщающая оценка инновационного потенциала вуза является комплексной и многоуровневой и должна основываться на показателях, отражающих специфику вуза, его деятельности.

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SECTION 29. Literature. Folklore. Translation Studies.

PHONOPOETICS OF THE TEXT

Abstract: *In this article we introduce the phonopoetics, the small progressive layer of linguopoetics. The article gives the opinions about the phonetic peculiarities of the speech, emotional – expressive functions of artistic literature and phonopoetics means of poems. Every linguopoetics analyzes demand to pay attention to the figure and meaning relations. Because, in the bottom of artistic text's form there is lead the meaning. The upper meaning and low meaning are retold. In the result the assimilation of the figure and meaning of artistic text are created.*

Key words: *Linguopoetics, phonopoetics, rhythm, melody, phragmatics, germenevtics, saadj, the differences of phonopoetic structure.*

Language: *English*

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The language is not only the means of communication, but it is the great resource which is carried on the knowledge to the next descendent and made the emotional – esthetic feelings.

By the speech, one can make the men, laugh make them happy, and make them cry [7: p. 19]. That is why, in order to study the communicative unit of linguistic structure, it is very important to learn it's emotional – expressive finctions and connotative meaning. The emotional expressive functions of linguistic units to be realized with the help of artistic speech. As the result, the philological science the linguopoetics become to study the emotional expressive functions of artistic text [3: p. 9]. The linguopoetics inclusive of the poetics features of all structural units. By its resourcing studies, it divides into phonopoetics, morphopoetics, lexical poetics, synthetic poetics and derivopoetics.

As the general problems of linguopoetics, the lexical poetics, the poetics of the text, poetic stylistic, phonosemantics come to the field of linguistics. But the phonopoetics have not investigated thoroughly yet. It shows us that the theme is very necessary to solve in Uzbek literature.

As the other branches, the linguistics is progressing at every moment. Though, every subject relays on the theory of its own every time and creates new ways of subject. Like the phonostylistics and phonosemantics, the phonopoetics and linguopoetics are made from these sciences. [9; 6]

Phonopoetics investigate the literary – description art, its music's soundings expressive features, the poem's art, the role of the sound and stress, the rhythm and the system of the sounds. The rhythm of poems are investigating in the linguistics as the object of the science. It has the rhythm and it is the base of the language. It shows us the importance of the poem's rhythm as in literature so in linguistics.

The sensitiveness of the poetic speech is united in the rhyme and melodious sound. German scientist Y.Yann considered as the poetry consists of the metrics rhythmic and the sound: "The poem is unique event, in the same time, the optic component, (to comprehension the text by seeing), acoustics and metrics component are included to it, and these three components make the sensual meanings," – he said [8; 10: p. 242-255].

Although, the phonopoetics is not investigated, most of linguists give a lot of information about this branch.

Aristotle in his "Poetics" gived the ideas about the phonetics units such as sound and rhythm [2: p. 20]. The arts including the sounds are given in "Funun ul-balog'a", of Shayx Akhmad ibn Hudaydod, in "Badoe us-sanoe" of Vosifiy.

A.Abdullayev in his "The expressiveness in Uzbek" wrote the information about it: "newaday's in Modern Uzbek there are such kind of expressiveness: 1) to pronounce the vowels strongly; 2) quantities stress; 3) germination. Below mentioned

events have the peculiarities and features. So, the expressivenes has some meanings, such as strengthening, weakening, caress, loving. These meanings create the changing the sounds, the strengthening of the sounds, increase the sound and divide the word to the syllable" [1: p. 3].

All kind of linguopoetics analyze one should pay attention to the relation of form and meaning. In every text by the meaning "form" we should understand the difficult expression. The upper and lower meanings are introduced. In the result, the asymmetries of form and meaning are happened in the literary text.

In the analyzes of the literary text place and time are very important, if we stand near to the object as the time, it's meaning, essence and express make the relations to objectiveness. This problem, especially, in phonetic system is very important. Because, "in Turkic language's history the phonetics define as the difficult and confusion branch. It has real cause and serious one. The difficulties in investigating the historical phonetics connect with the spellings, but the spellings don't mention in any work until the middle of the XX century" [4: p. 25].

The actual phonetic language means can be analyzed from the sounds to the synthetic units.

The poetic speech phonetics may be the very important object of investigation. " The barmoq" poetical rhythm system are based on the quantity of the syllables, in spite of, it divides to the "turoq", intonation peculiarities the role of pause and a lot of arts connection create the phonopoetics, the connection pot of the phonetics and poetics. The phonetics is the investigation of poetic speech. But, while we analyze the phonetic peculiarities, we don't invent the phonopoetics features.

Besides of, the places of phonetic peculiarities which are used in poetic mentioned in writing, but has some hidden meanings. The built structure of poetics is the phonetic units.

The science, which is investigated the esthetic functions of language of the artistic speech what becomes very high authoritative branches of philology is the linguopoetics [5: p. 7]. As, every branches have their little layer, the upper layer of linguopoetics is the phonopoetics.

While, the phonopoetics are investigating as the branches, it has peculiar specific features and we should define the object of investigations. As the specific features we can count the formation of poetic work, logical and esthetic, expressive quality, melodically, tone, timbre, the rhythmic intonation and emotion peculiarities. Since that, truly these are the investigative object of phonetics.

At the same time the phonetic text are the reasons to pronounce as the people need. And this is belonged to the germenevtics. The function of the germenevtics is to remove before hand «the lacks of the speech and wrong pronunciation of the text». The function of germenevtics is to explain the comprehensive events of phenomenological analyze. Such interpretation gives the chance to find the important point's of the text.

The commentary and the analyze are demonstrated as the event and the result. The commentary begins when we appeal to the text. It is the first condition of the germenevtics. It means to confess to another variants of the analyze and substance.

To understand the text, the in terpreter should not stay away the events. It doesn't matter how to accept it. On the contrary, he strives to understand the meaning of the text. If he wants to interpret the text, he should connect it with the essence.

We should consider, while the interpretation or comprehension of something, one of the pieces are left. It comes across the speaking, talking and oral speech. Sometimes, during the speaking of the life of people, their happiness, proud and the fate, something is not spoke. Because, the speech cannot retell all the essence of these. And the feelings do not define in the oral speech. The essence of text, it's meaning, the traditions the intellectual degrees of subject, and thinking depend on speech. The aim of thinking to understand the world, it's being, and it's connection. To learn the other world and understand, firstly the author and character should understand itself.

The structural linguistics pay attention to the understanding the degrees of relations of the speech and language, it's colourness. That is why, the cognitive linguistics grows up the structural linguistics, it pays attention to the discursive sides.

In fact, the "soul" of the language is the discourse. All the social function, cumulative function, and emotional-expressive functions of the language reflect in discourse.

The emotional-expressive function of the artistic speech is mainly expressed with phonetic means and melody. Phonetic means are the main relevant characteristics of the artistic discourse, and the creator of the beauty of speech. Thus not only the lexical poetics part but also phono-poetics, morpho-poetics, and syntactic poetics parts of the lingua-poetics which study the emotional and aesthetic function of the certain language should became serious research objects. There are special expressemas which include such means as *tonema*, *syllabema*, and *vowel harmony*.

Expressemas serve to express the emotional state of the speaker in speech; to differentiate the type of the sentence by its aim; to express the gradation of the things and events, feature and characteristics, motions and states; to function artistic-aesthetic tasks.

The phonetic means, like the other poetic ones should characterize it's peculiarities and applies the charming speech. To understand and interpreter the

phonetic speech are representated by the philological preparing of the (interpreter) researchers. Study the text, germenevtica serves to represent the phonetic units such as the distinctive, expressive function.

The phonopoetic peculiarities are the main means of creation «the azuz». Because, «the azuz» is based on the vowel harmony, open – close syllables. The ravii is the leader and necessary element of the rhyme. The rhyme and it's features, pronouciations relates to each other, and these features are in motion, this position gives the chauce to increase the opportunities of rhyme, to change the quality and to carry out of the monotone.

«The barmoq» rhythme is not marked by it's quantity of syllables but the division of the syllables in the line.

Making conclusion, we should name the functions of phonopoetics and germenevtics methods:

- phonetic means don't for the logic means, but do the function of the artistic – esthetic express;
- the poetic aim of the speaker defines the sounds;
- seethe saaj, rukn, rhythm and rhyme are represented by the phonetic peculiarities and they considers as the phonopoetic means;
- the «azuz» and «barmoq» poem system's researching object is the phonopoetic means;
- the role of the art «saaj» is very big. That is why, saaj makes the nazm in the phonetic sides;
- segmentation also has very important role in poem structure, so, gemination of poem, harmony, open and close syllable and changing the consonant relate to «hijjo».

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SECTION 29. Literature. Folklore. Translation Studies.

HARMONIZED ORIENTAL CLASSICAL ARTS

Abstract*: The article studies the place of the literal synthesis in the oriental classic arts, especially in the literary arts, ways of their development based on the interrelations of the types of literary arts. On the basis of real examples the author tries to investigate the interrelations of poetry, calligraphy and the art of creating miniature.*

Key words*: classic arts, literal synthesis, calligraphy, miniature, visual image, graphical verse.*

Language*: English*

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Dealing with the examples of classic literature the authors often speak about the fact that creators of that time often lean on literal and ideal conditionality. As the reason for this fact they stress that recognizing the world as a temporary phenomenon they seek the reality outside this existing world. In other words in the creative activities of the artists of that time as a rule try to hide their individual peculiarities, i.e. they try to avoid outer signs of the temporary world. Therefore

In the classic arts traditional nature and conditionality prevail a lot. At the same time the above mentioned factors led to weakening the objective description.

The experts who are engaged in the oriental classic literature and bookmaking graphics as E. Polyakova and Z.Rahimova point out that it is rather difficult to define the personality of the author which is hidden behind the philosophical and skillfully created literary works. They wrote: "The creators of that time did not try to express their own feelings and sociality of that time [6.23].

The lack of real (objective) description in their works can be explained by their feeling to avoid sociality. As a matter of fact objective description can be reached by the interrelations of time and place. But this fact doesn't mean that

The feelings of these times were not realized (objectivized).

Though the artist does not avoid the conditionality he/she tries to introduce his literal ideas into definite visual images. Especially cooperation of the classical literature with the art of calligraphy provides the possibility of dispatching joy to the poet.

In the process of investigating the cyncretic relations of poetry and calligraphic arts it is necessary to keep in mind that literary synthesis has very deep and ancient roots. As a matter of fact the development of any type of art is greatly influenced on the form of expressing the contemporary arts.

Watching the expressive peculiarities of the oriental classic music, miniature, calligraphy as well as the literature we can see that these arts have been developing in great connection with each other.[10.20]

Its impossible to imagine the classic music without 'arooz' verse and the miniature can't be imagined without literary works. Therefore in the oriental arts we can feel that these arts are in syncretic relation not only by ideal-literal point of view but also by expressive peculiarities.

In his book 'The city of highly educated people' Abu Nasr Forobiy who had the title of 'highly educated tutor' in his time wrote: "There is a kind of relationship between the representatives of this art and decorators of the house. Though their objectives in their art are different there is something in common

In the forms, creation and the aims they correspond each other. The things that decorate the art of poetry are words and ideas, the things that decorate the objectives of painters are paints of different colour. There is a difference between them but both of them lead the imagination and feelings of people t o one thing – imitation [4.124].

Another type of arts is calligraphy. Its importance both in classical literature and in the art of painting is the same. In other words calligraphy can be treated as a product of strong synthesis between poetry and painting (water colour).

Calligraphy is one of the most ancient types of the oriental art.

After the introduction of Islam in Central Asia Arbic alphabet has been introduced in all the spheres of human life.

Calligraphy based on the Arabic alphabet began to develop rapidly and in the Muslim world it became a special type of art. We would not be mistaken if we say that Islam had a great influence on the development of calligraphy as an independent art. Because Islam prohibits portraiting the humans and animals. Such a prohibition led to further development of broidery and calligraphy as an important phenomena in the oriental aesthetics. On this very point we also can say that the art of miniature began to develop in close connection with calligraphy.

In the East miniature has been living as a bookmaking graphics, a definite part of the text, as a kind of writing. In other words miniature is enriched with elements of calligraphy and engraving and is brought closer to the examples of water-colour and that of expressive principles of literature (poetry). Talking about the synthetic relations these two arts we should take into consideration that this art provides relationship and leadership and occupies the central place in the literal works.

The main factor providing development of calligraphy as an art is the fact the Holy Qur'on has been written in this alphabet and special form and expressiveness of the Arabic alphabet [1.4].

Dealing with interrelations of the classical literature and calligraphy we can see such a closeness not only in bookmaking graphics but also in the relations of classical poetry and handwriting.

Particularly bookmaking art based on the Arabic alphabet is directly connected with the art of writing:

"Мим"и йилони дамидин ўт сочиб,
Йўл бошида ётибон оғзин очиб...[3.6]
("Mim" lies on the road and dispatches its poison through its open mouth)

In this example taken from the "Hayrat-ul-abror" by Alisher Navoiy the form of the letter 'mim' serves as a means of expressing the literal idea, i.e. at the initial position the Arabic letter "م" (initial position "ـمـ") the form of the letter takes the form of a snake[9.135]. In this case not the meaning of the letter but its form i.e its visual esteem is more important

In general, treating these arts as a means of depicting the author's mastership and the beauty and attractiveness of the poem is not satisfactory enough. Because there exists necessity of demonstrating of the author and excitement of the reader by seeing it. Especially this peculiarity is displayed by the syncretic relation of uttering the word at the leadership of the classical literature

Those limitations of Islam not only makes the painter and calligraphist seek permanent investigations of the matter but also satisfy the aesthetic need of the reader to feel this beauty in the process of seeing (reading) the text. Perhaps it is because of the fact that classical poets must have had a permanent need for the description of the beloved lady.

Usually the painter could not describe the real beauty of the beautiful girl, to make it clear he avoided it. Instead of it he tried to use traditional-conditional elements: a slim waste, good-looking face, eyebrow looking like an arrow, etc.

It was difficult to notice the individual character of a definite person and the natural size of parts of his body. Therefore classic miniatures were closer to the expressive arts than painting. Perhaps by means of such expressive settlement the painter must have tried to avoid he traditional limitations. In his work he tries to stress that he wants to paint not the real body of an object but his inner world. Nevertheless the miniatures satisfy to some extend the need of his fans of the visual art.

This way with the help of definite means the poet also used to try to satisfy the aesthetic needs of his readers.

We seem not to be mistaken if we say that such 'demands' of the readers make the creator use the possibilities of other types of art and as a result of this fact there appears new forms of synthesis of two or more types of art.

Ataulloh Husainiy's book 'Badoyi-us-sanoyi' is about 'arooz' type of verse and its fifth part is titled as 'The beauty of word and explanation of beauties belonging to the sight of the letters'. This part of the book contains a lot of information dealing with the sight of the letters. For instance, he author says: " *The art of **'muqattaa**' contains the words in which the letters are separated from each other", " the **'muvassal**' is another type of art in which the letters in the word are not separated from each other" and '**raqtoo**' is a type of art in which one letter of each word is dotted but only one letter is dottless and '**e'not**' is used to by the poet or calligraphist to decorate the word but it is needles, as the word is full enough even without it… the main aim is to decorate the word.[5.35]*.

Moreover, the book contains more information about other types of art. It can seen that in order to express his emotions and other inner feelings the poet tried to lean not only on the meaning of the word but also had to take into consideration the visual shade of the letters as well. This brings the poetry close to descriptive art.

In modern literary studies such works are studied as examples of graphical poetry, i.e reading the verse by means of visual aids (your eyes) you can feel aesthetic influence from the verse.

Graphical poems have been in use during the last two thousand years and it can be observed in the samples of ancient Greek poetry. The Greek poet Simmiy Rodosskiy is known to have created verse the of which resemble an egg, an ax, a wing etc. During the later period this tradition has spread wide in the Western literature as well. In the works of such poets as Rable, Polotskiy, Derjhavin, Appoliner we can see more improved version of this branch of art. In the XXth century this art began to develop in the form of calligramic genre.

Dealing with his calligrams Appoliner says:"The possibilities of this art is very wide, we can see in it the synthesis of water colour and the music"[8.46]

Even today we can see the example of such an art in the world and in the Uzbek literature (I. Otamurod, Fahriyor).

Not in vain we have paid special attention to the essence calligrams as their roots are closely connected with calligraphy.

We try again to have a glimpse of the above mentioned book by Ataulloh Husainiy. He writes: **"Mu'aqqal**" is the way of creating the verse in which the letter takes the form of mathematical unit", **'mudavvar'** is the way of creating verse taking it into a circle", **'mushajjar**' is the form of calligram in which the verse is written in the form of a tree"[5.38].

If to compare the graphical poems and the works of the calligraphist it seems that they have equal estimation. But in the poems of the poet expression of emotion and in the works of a calligraphist expressiveness occupies a leading position. Such works have wider possibilities of expression. Because in the graphical poems the reader feels a two sided influence i.e. the reader by means of eyes sees a definite form and imagine a real object. Then the reader mixes his imagination with the meaning of the verse. This is important for the creator as with this he objectivizes his emotions. And the reader at the same time enjoys the both expressive and decorative art.

Man receives the information by means of visual aids and it is natural that his needs are directed to visual arts. Each creator (whatever trend he belongs to and whenever he may live) creates his products in accord with the needs of his consumers. Thus literature enters into synthesis (relation) with other types of art due to a definite need. In reality this need serves as a necessary stimulus for permanent development of different types of art.

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MATHEMATICAL MODELING OF STRESS-STRAIN STATE OF COMPOSITES REINFORCED WITH DISCRETE FIBERS IN TENSION AND COMPRESSION, TAKING INTO ACCOUNT PHYSICAL NONLINEARITY

Abstract: *The article presents the study results of the stress-strain state of the steel fiber reinforced slag concrete elements. In order to determine the physical and mechanical characteristics of the fiber-reinforced concrete experiments carried out, the analysis of which yielded mathematical relationships to describe the stress-strain model in tension and compression for designs of such cementitious composites. To describe the stress-strain state modified depending offered N. I. Karpenko and C. Sujivorakul. The mathematical models used piecewise linear displacement diagrams fibers in concrete. Authors analyzed the convergence of the theoretical curves constructed using a modified formula and experimental data.*

Key words: *steel fiber, stress-strain model, tensile behavior, compressive behavior, stress-deformation diagram.*

Language: *English*

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Expanding the use of reinforced structures of concretes which include the secondary wastes of different industries and local aggregates, promotes economical consumption of material and energy resources, reduce the cost and time consuming processes. These concretes, in particular, to fine slag concrete based on dropout from the crushing of the cast slag crushed stone (CSC). One of the ways to improve the quality of the concrete is the introduction of the slag mixture of steel fibers having high strength characteristics and increased tensile modulus.

It is known that the introduction of concrete reinforcement allows to obtain the dispersed composite having a tensile strength several times higher than for concrete matrix. Increasing the strength properties of steel fiber reinforced slag concrete (SFRSC) allow to eliminate the reinforcing bars in some designs.

Importantly, increase the level of automation of calculations structural elements makes higher demands on the information content of the research results of the actual work, which is particularly important for creating predictive algorithms using diagram methods. A large part of building

construction elements based on such characteristics of the material, as the prism compression strength of concrete R_b, cube compression strength R_m or durability of concrete under axial tension R_{bt}. A set of data for SFRSC-structures is not sufficient, because in addition to the strength properties of a significant role in the calculation here is also included a deformability (initial modulus of elasticity of the slag concrete (SC) in tension E_{b0} and modulus of elasticity of the SFRSC E_{fb0}, limit deformation in tension of the SC ε_{btR} and for SFRSC $_{fbtR}$, limit deformation in compression of the SC ε_{bR} and for SFRSC ε_{fbR}).

The aim of this study is to provide a computational formula that will determine the deformation characteristics SFRSC taking into account the concrete age. On the basis of experimental data to construct incremental algorithm for calculating the structural elements under axial tension and compression loads.

The main findings deformability properties of fine-grained concrete are given in [1].

Tests were conducted with the specimens which include fine-grained slag produced of "NLMK". It is a waste of crushing of cast slag crushed stone gravel fractions 0-5 mm and a bulk density 1085-1135 kg/m^3. For the production of the specimens was used the composition, presented in table 1.

Table 1

Composition of experimental specimens.

Composite	Characteristic
binder	cement brand PC-500 D0 (Lipetsk)
plasticizer	"Relamiks" (10% solute)
particulate reinforcement	Fiber "Dramix" Belgian firm "Bekaert" - chopped steel wire 0.8 mm in diameter and 60 mm in length (R_f = 1100 MPa, E_f = 1,95•10^5 MPa, d_f = 0,8 mm, l_f = 60 mm)

Test specimens in tension was conducted on a special experimental device [2]. Compression and tensile tests were occurred using 100 kN press and universal tensile testing machine with maximal load 20 kN respectively. In the study in tension and compression SFRSC-specimens used concrete matrix classes B5, B7.5, B10, B15, B20, B25, B27.5.

In studies of SFRSC-specimens on tensile varied volumetric content of fiber reinforcement μ_{fv} (%): 0, 0.125, 0.25, 0.375, 0.5, 0.75, 1.3, and concrete age t (days): 3, 7, 14, 21, 28, 56, 112, 224, 448. The sketches of specimens shown in Fig. 1. The distance between the fiber-in transverse section of the specimens were 5 and 10 mm.

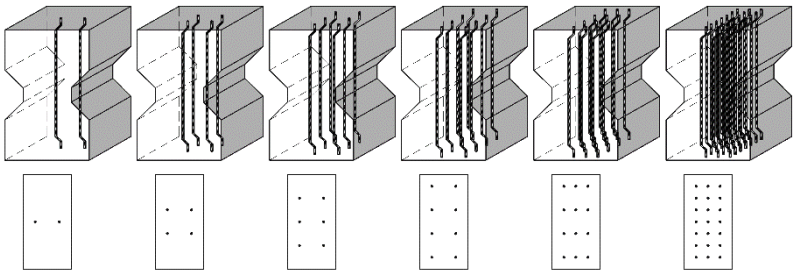

Figure 1 - Sketches of specimens for tensile test.

Durability of SFRSC in axial compression was determined on specimens in the form of cube with sides of 60 mm. Variability of fiber reinforcement volumetric content in SFRSC-specimens μ_{fv} (%): 0, 0.125, 0.25, 0.375, 0.5, 0.75, 1.3, and concrete age t (days): 3, 7, 14, 21, 28, 56, 112, 224, 448; coefficient reflecting fibers work in a section perpendicular to the direction of the external compressive load k_n: 0,247, 1,00. Sketches of test samples are shown in Fig. 2 a, b.

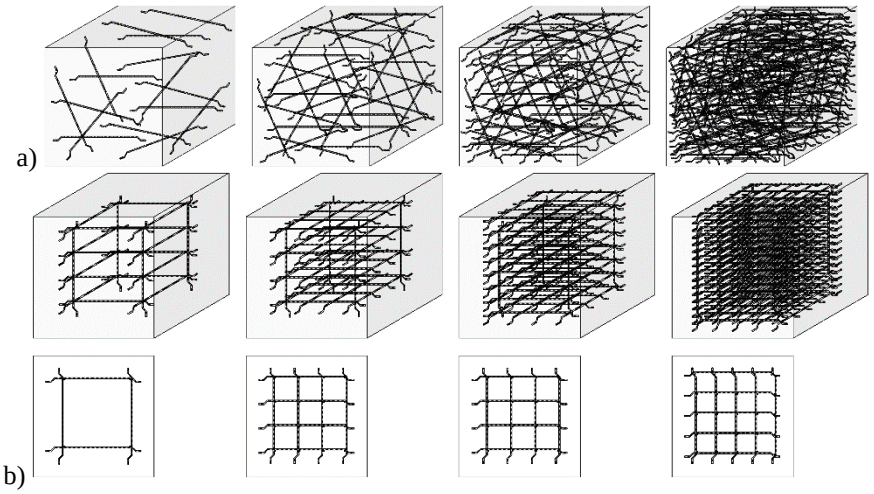

Figure 2 - Sketches of specimens for compression test: a) k_n=0,247, b) k_n=1

"Stress-relative deformation" ("σ-ε") diagrams as axial tensile test results of SFRSC-specimens are shown in Fig. 3 a (aged for 3 days concrete matrix class B20) and Fig.3 b (aged for 28 days concrete matrix class B20).

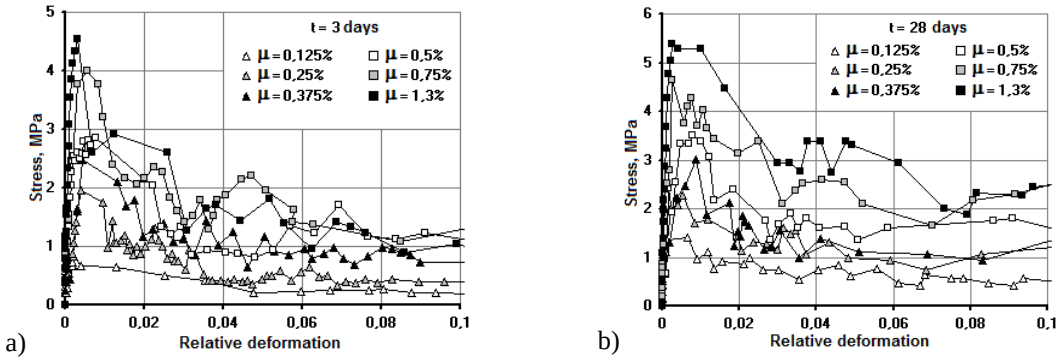

Figure 3 - Experimental "σ-ε" diagrams obtained in an axial tensile test of SFRSC-specimens.

Deformation of SFRC is a complex process, the study of deformation tensile properties of SFRC revealed that it is characterized by the following work stages:

- practically linear section of the diagram "σ-ε" corresponding to the elastic material;
- curved "σ-ε" section of the diagram, starting with the crack corresponding to the pseudo-plastic material work.

Various researchers [3, 4, 5], despite receiving comparable data, provide a variety of interpretations of the results. Thus, at the present time authors deduce various estimates moment of cracking due to differences in the test methods, experimental specimens and used equipment.

Tensile diagram "σ-ε" for SFRSC can be represented as schematic form shown in Fig. 4 a. This diagram conditionally divided into two portions and described using seven characteristic points. The bright area of the diagram is the area where there is collaboration fiber and concrete work (occurs addition of tension diagrams concrete and fiber), the dark area of diagram describes comprehensive work of the fibers in pull-out of the slag concrete-matrix.

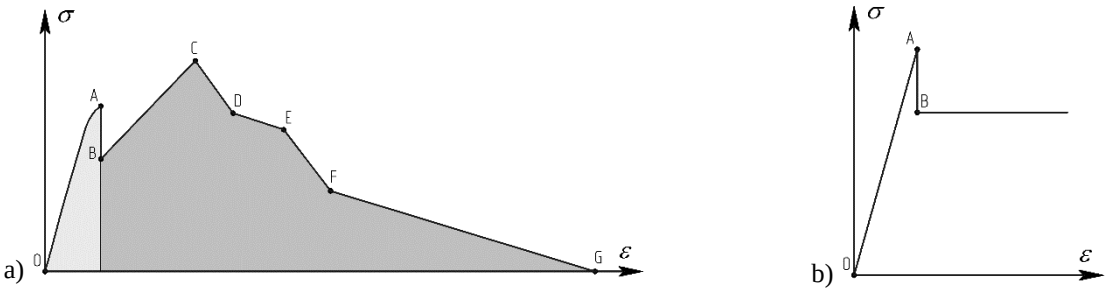

Figure 4 - Schematic forms tensile diagram for SFRC and its characteristic points.

In this case, the stress in section of concrete specimens at the site when the relative deformation of the sample does not exceed the limit values of relative deformations for concrete-matrix, and equation is performed:

$$N_{fbt} = N_{bt} + N_{ft}, \tag{1}$$

where N_{fbt}, N_{bt}, N_{ft} is loads generated by tensile in SFRSC specimens, in concrete and in the fiber respectively. Expressing load through the voltage and the cross-sectional area, we get the following equation:

$$\begin{aligned} N_{bt} &= \sigma_{bt} A_b = \varepsilon_{fbt} E_{b,red} A_b, \\ N_f &= \sigma_f A_f = \varepsilon_{fbt} E_{f,red} A_f, \\ N_{fbt} &= \varepsilon_{fbt} \left(E_{b,red} A_b + E_{f,red} A_f \right), \\ \sigma_{fbt} &= \frac{\varepsilon_{fbt} \left(E_{b,red} A_b + E_{f,red} A_f \right)}{A_b + A_f}. \end{aligned} \tag{2}$$

There σ_{bt}, σ_f, σ_{fbt} is stress values in slag concrete, fiber and SFRSC respectively; A_b, A_f is sectional area slag concrete and fiber; $E_{b,red}$, $E_{f,red}$ is the module of elasticity of slag concrete and fiber; ε_{fbt} is relative deformation of SFRSC specimen.

Limit values of relative deformations of slag concrete-matrix ε_{fbtR} will also depend on the percentage of volume of reinforcement:

$$\varepsilon_{fbtR} = 0{,}24 \cdot \sqrt[3]{R_{bt}(t)} \left(1 + 8 k_{or}^2 \mu_{fv}\right) \cdot 10^{-3}, \tag{3}$$

where $R_{bt}(t)$ is the tensile strength of concrete at the age t, μ_{fv} is volumetric content of fiber reinforcement.

Further, when the relative deformation of the sample exceeded the limit value relative deformations slag concrete-matrix ($\varepsilon_{fbt} > \varepsilon_{fbtR}$), the diagram is described by adding the single fiber pull-out diagrams.

The "load-displacement" curve for the loaded end of the fiber with a single limb at the end can also be represented as a piecewise linear diagram (Fig. 5).

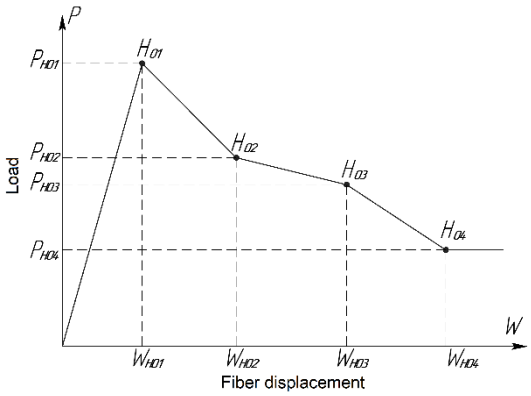

Figure 5 - The "load-displacement" single fiber pull-out piecewise linear diagram

In [6] presented the results and conclusions of the mathematical relationships for the coordinate reference points piecewise linear pull-out diagram "load-displacement" for steel fiber, working under load in slag concrete-matrix (Fig. 5):

Table 2

- point H_{01}:	$W_{H01} = 1 - 0{,}02R_b(t)$, $P_{H01} = (355 + 11R_b(t))(0{,}55 + 0{,}015l_{f,an})$;	(4)
- point H_{02}:	$W_{H02} = 3W_{H01}$, $P_{H02} = 0{,}7P_{H01}$;	
- point H_{03}:	$W_{H03} = 6W_{H01}$, $P_{H03} = 0{,}6P_{H01}$;	
- point H_{04}:	$W_{H04} = 8W_{H01}$, $P_{H04} = 0{,}4P_{H01}$.	

There $l_{f,an}$ is embedding fiber length (mm), $R_b(t)$ is slag concrete compressive strength at age t (MPa), W_{H0i} is abscissas points (displacment of fiber, mm), P_{H0i} is ordinate points (load, H). Values $R_b(t)$ and R_{bt} (t) are determined according to equations proposed in [7].

Given these, coordinates the points of tensile "σ-ε" diagrams for SFRSC will be determined by the following formulas:

Table 3

- point *O*:	$\varepsilon_{fbt} = 0$, $\sigma_{fbt} = 0$;	(5)
- point *A*:	$\varepsilon_{fbt} = 0{,}24 \cdot \sqrt[3]{R_{bt}(t)}(1 + 8\mu_{fv}) \cdot 10^{-3}$, $\sigma_{fbt} = \dfrac{\varepsilon_{fbt}(E_b A_b + E_f A_f)}{A_b + A_f}$;	
- point *B*:	$\varepsilon_{fbt} = 0{,}24 \cdot \sqrt[3]{R_{bt}(t)}(1 + 8\mu_{fv}) \cdot 10^{-3}$, $\sigma_{fbt} = \dfrac{\varepsilon_{fbt}(E_b A_b + E_f A_f)}{A_b + A_f} \cdot \left(1 - \dfrac{7 \cdot 10^{-4}}{\mu_{fv}}\right)$;	
- point *C*:	$\varepsilon_{fbt} = 10\varepsilon_{fbtR}$, $\sigma_{fbt} = \dfrac{\sum_{j=1}^{N} P_{H01,j}(k_A)^{\frac{3n}{r_{cp}}}}{A_f + A_b}$;	
- point *D*:	$\varepsilon_{fbt} = 10\varepsilon_{fbtR} \cdot \dfrac{W_{H02}}{W_{H01}}$, $\sigma_{fbt} = \dfrac{\sum_{j=1}^{N} P_{H02,j}(k_A)^{\frac{3n}{r_{cp}}}}{A_f + A_b}$;	
- point *E*:	$\varepsilon_{fbt} = 10\varepsilon_{fbtR} \cdot \dfrac{W_{H03}}{W_{H01}}$, $\sigma_{fbt} = \dfrac{\sum_{j=1}^{N} P_{H03,j}(k_A)^{\frac{3n}{r_{cp}}}}{A_f + A_b}$;	
- point *F*:	$\varepsilon_{fbt} = 10\varepsilon_{fbtR} \cdot \dfrac{W_{H04}}{W_{H01}}$, $\sigma_{fbt} = \dfrac{\sum_{j=1}^{N} P_{H04,j}(k_A)^{\frac{3n}{r_{cp}}}}{A_f + A_b}$;	
- point *G*:	$\varepsilon_{fbt} = 10\varepsilon_{fbtR} \cdot \dfrac{W_{H04}}{W_{H01}}$, $\sigma_{fbt} = 0 \cdot$	

Where N is quantity of fibers in SFRSC spacimen, the n - number of fiber within a radius of 10 mm and affect the operation of the unit central fiber, r_{cp} is the average distance to the fibers located within a radius of 10 mm, the k_A is coefficient taking into account the work of the central fiber as a result of effect on neighboring fibers, and it is determined by the formula [8]:

$$k_A = \left[(0{,}24 \cdot l_{f,an} - 2{,}7) \cdot \frac{\lambda_f^2}{R_m} + (7{,}7 - 0{,}52 \cdot l_{f,an}) \cdot \frac{\lambda_f}{R_m} + 1 \right], \quad \lambda_f = l_{f,an,c} / l_{f,an} \tag{6}$$

where, $l_{f,an,c}$ is the mean value of the anchorage of neighboring fibers, mm.

Note that for each fiber, which diagramm summarize, it is necessary to calculate the parameters: n, r_{cp} and k_A.

Such representation of "σ-ε" diagrams for SFRSC specimens tensile, requires consideration of the large amount of data, it is convenient to use in the calculation of structural elements on a computer.

Figures 6 illustrate the theoretical curves constructed by the formulas (3)-(6) for concrete class B20 and at matrix age 28 days.

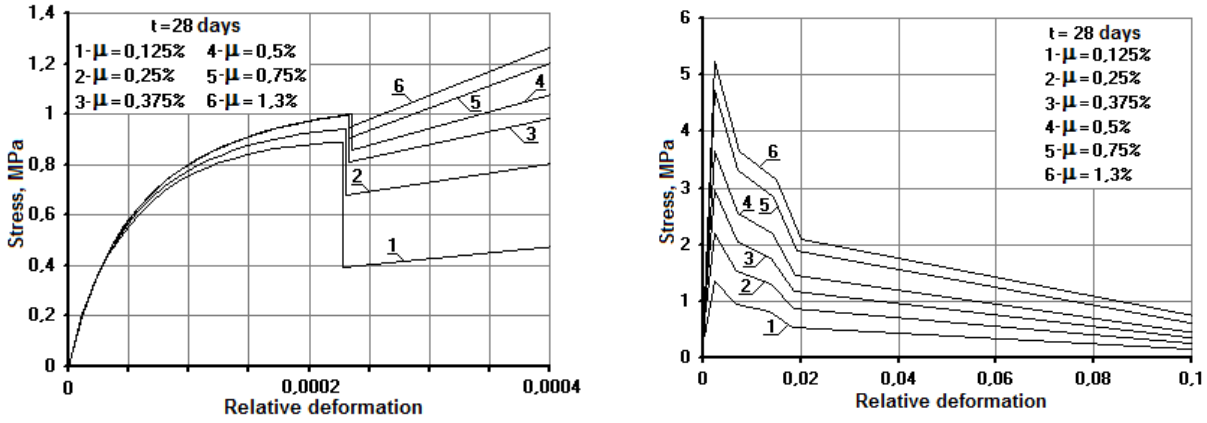

Figure 6 - Theoretical "σ-ε" diagrams for tensile SFRC constructed according to formulas (5), (6)

The test results of the SFRSC specimens under axial compression are shown in Fig. 7 a (slag concrete B7.5 class at the age of 3 days, k_n = 1), and in Fig. 7 b (slag concrete class B15 at the age of 3 days, k_n = 0,247).

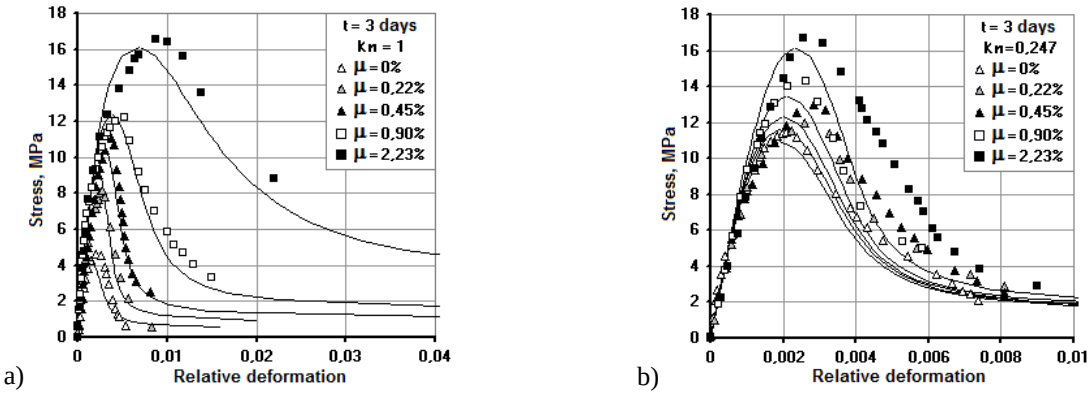

Figure 7 - The experimental data and the theoretical curves "σ-ε", obtained when tested on specimens in axial compression SFRSC

One of the known analytical expressions, allowing to express the relation between stress and strain of concrete under axial compression is the formula proposed by N. I. Karpenko [9]. It uses the rate of change secant modulus:

$$\nu_{(f)b} = \nu_{(f)b,R} \pm (\nu_0 - \nu_{(f)b,R})\sqrt{1-\omega_1\eta-\omega_2\eta^2}\,, \qquad (11)$$

where $\nu_{(f)b,R}$ is the rate of change secant modulus $\nu_{(f)b}$ ($0<\nu_{(f)b}<1$) in the top of the "σ-ε" diagram:

$$\nu_{(f)b,R} = \sigma_{(f)b,R}/(\varepsilon_{(f)b,R}E_{(f)b}),\ \sigma_{(f)b,R} = R_{(f)b}\,, \qquad (12)$$

$\nu_{(f)b,R}$ is relative strain at the maximum stress, $E_{(f)bt}$ is initial modulus of elasticity of concrete in tension, η ($0<\eta<1$) is stress level:

$$\eta = \sigma_{(f)b} / \sigma_{(f)b,R}, \quad (13)$$

v_0 is rate of change secant modulus at the beginning of the diagram (v_0=1 for the diagram uplink and v_0=2.05$v_{(f)b,R}$ for downlink diagram), ω_1, ω_2 is the parameters of the diagram curvature.

Secant modulus of elasticity of concrete (SFRSC) for any value of the stress $\sigma_{(f)b}$ is determined by the formula:

$$E'_{(f)b} = \frac{\sigma_{(f)b}}{\varepsilon_{(f)b}} = \nu_{(f)b} E^0_{(f)b}, \quad (14)$$

In [9] suggested parameters of diagram curvature determined by the next formulas.

- for the uplink diagram:

$$\omega_1 = 2 - 2{,}5\nu_{(f)b,R}, \ \omega_2 = 1 - \omega_1; \quad (15)$$

- for downlink diagram:

$$\omega_1 = 1{,}95\nu_{(f)b,R} - 0{,}138, \ \omega_2 = 1 - \omega_1. \quad (16)$$

To describe the stress-strain state of concrete applied modified depending offered N. I. Karpenko and C. Sujivorakul. The mathematical models used piecewise linear displacement diagrams fibers in concrete. The coordinates for these diagrams were obtained by analyzing the experimental data. The theoretical curves constructed using formulas showed high agreement with experimental data.

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SECTION 3. Nanotechnology. Physics.

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SOME QUESTIONS OF INTERACTION OF ELECTROMAGNETIC WAVES WITH THE ELECTRONIC SUBSYSTEM OF THE ATOM

Abstract: *In an article for an explanation of the photoelectric effect phenomenon offers new ways of its theoretical analysis in the course of physics. Considerable attention is paid to the analysis of wave processes arising from the interaction of photons with electrons substances. It described the process of absorption of a photon by an electron. The possibilities of absorption of a photon by a stationary free electron and photon absorption of a photon moving electrons. It is shown that an electron at rest can not absorb a photon. Analyzed many aspects of the presentation of the phenomenon of the photoelectric effect.*

Key words: *electromagnetic waves, photons, atoms, electrons, interaction, photoelectric effect.*

Language: *English*

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Photoelectric effect (photo effect) belongs to the special processes of nature that widely used in engineering. At the same time it is one of the most important problems of Physics during studying the nature of the light proving its wave and quantum characteristics. Despite this fact, in the course of Physics this phenomenon is stated as a simple liberation of the electrons from the surface when light beam gets on the metal, and at the best case, completed with the Stoletov's known laws [1].

In the textbooks for the enhanced studying of Physics [2,3] the condition of the liberation of the electron from a metal is determined by the A.Einstein equation:

$$\varepsilon_\nu = h\nu = A_0 + \frac{m\vartheta^2}{2};$$
$$(\varepsilon_\nu = h\nu > A_0),$$

where, A_o – work of the liberation of the electron from the metal that is phenomenon of the photo effect can only occur if the photon energy will be more than the work of the liberation of the electron. But we are not talking about what the state of the electrons can absorb the photons to overcome the potential barrier of the surface.

Thus, in practice, when studying the phenomenon of the photoelectric remains as unknown effect for the pupil – a quantum of light (photon) is absorbed by a free electron or an electron associated. It seems that even teachers have a vague notion. It is evident therefore that for the elucidation of this question there is a method to shed light on the physical side of this problem. In this regard, in order to describe clearly the process of the absorption of the photon by the electron we consider that their interaction takes place as the clash. From the point of view of the corpuscular wave-particle duality, such an approach is not considered as erroneous. Then the process takes place according to the laws of the conservation of the energy and momentum. Applying these laws we analyze the question of the absorption of a photon electron according to three aspects.

1. Possibility of the absorption of a photon by a free electron of the photon.

As a result of the collision with the stationary photon the free electron make a move. Let its speed be ϑ_1 (figure 1).

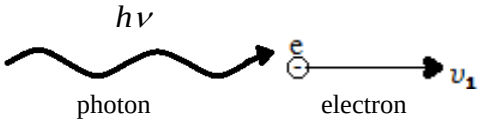

Figure 1 - The impact of a photon on a stationary electron.

In accordance to the law of the conservation of energy this movement can be described as follows:

$$h\nu + m_0c^2 = mc^2. \qquad (1)$$

$h\nu$ - is the energy of the photon; m_o - is the rest mass of the electron; m - is the electron mass in a motion.

Expressing body weight in a motion through a change in the rest mass, the equation (1) is transformed into:

$$h\nu + m_0c^2 = \frac{m_0c^2}{\sqrt{1-(\vartheta_1/c)^2}} \qquad (2)$$

Solving the last equation find the speed of the electron after the absorption of a photon:

$$\vartheta_1 = \frac{c\sqrt{\nu h(h\nu + 2m_0c^2)}}{h\nu + m_0c^2} \qquad (3)$$

The same value of the speed of the electron can be determined based on the law of the conservation of momentum. Let the speed of the electron in this case be ϑ':

$$\frac{h\nu}{c} = \frac{m_0\vartheta'}{\sqrt{1-(\vartheta'/c)^2}}.$$

In the left part of this equation $h\nu/c$ - is the initial quantity of a motion (momentum) of the photon, on the right one is a momentum of the electron after the absorbing of the photon. From this equation it is determined the speed of the moving electron:

$$\vartheta' = \frac{h\nu c}{\sqrt{(h\nu)^2 + (m_0c^2)^2}}. \qquad (4)$$

If the resting electron in a collision absorbs a photon then the values of the speeds determined using the laws of conservation of energy and momentum must be equal to each other. However, comparing the right sides of the expressions (3) and (4) it is not difficult to verify that $\vartheta_1 \neq \vartheta'$. Therefore we can conclude that a motionless electron cannot absorb the photon.

The possibility of the absorption of a photon by a moving electron.

Of course, in the general case the direction of the movement of the moving electron and the photon before the collision can be different. But to facilitate the resolution of this question we will focus on the case when the directions of the mutual relative motion of the electron and the photon will be perpendicular (figure 2):

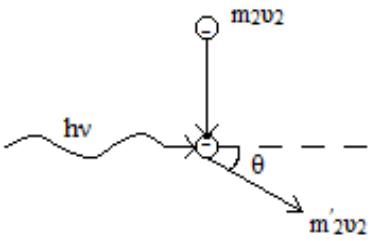

Figure 2 - The collision of a photon with a moving electron.

Let the speed of the electron before the collision be ϑ_2, weight of $m_2 = \frac{m_0}{\sqrt{1-(\vartheta_2/c)^2}}$.

As a result of a collision the electron absorbs a photon and changes its direction of a motion. The electron moves forward at angle $\angle\theta$ to the direction of a motion of the photon. As a result, its speed will be ϑ and the weight of $m'_2 = \frac{m_0c^2}{\sqrt{1-(\vartheta/c)^2}}$. The speed of the electron after the collision is determined on the basis of the law of the conservation of the energy from the relation:

$$h\nu + m_2c^2 = \frac{m_0c^2}{\sqrt{1-(\vartheta/c)^2}} \qquad (5)$$

Is seen to be:

$$\vartheta = \frac{c\sqrt{\nu h(h\nu + 2m_0c^2) + (m_2^2 - m_0^2)c^4}}{h\nu + m_2c^2} \qquad (6)$$

Now to calculate the same quantities on the basis of the law of the conservation of a momentum the following equation is compiled that determines the horizontal component of a momentum:

$$\frac{h\nu}{c} = \frac{m_0}{\sqrt{1-(\vartheta'/c)^2}}\vartheta'\cos\theta. \qquad (7)$$

Here ϑ' - is the speed defined by this equation. Component of a momentum in the vertical direction

$$m_2\vartheta_2 = \frac{m_0}{\sqrt{1-(\vartheta'/c)^2}}\vartheta'\sin\theta \qquad (8)$$

Squaring both sides of equations (7) and (8) and summing them term by term find the speed of an electron ϑ' after the absorption of a photon:

$$\vartheta' = \frac{c\sqrt{(\nu h)^2 + (m_2\vartheta_2 c)^2}}{(h\nu)^2 + (m_0c^2)^2 + (m_2\vartheta_2 c)^2}. \qquad (9)$$

And in this case equating the right sides of the equations (6) and (9) make sure that $\vartheta_1 \neq \vartheta'$. Since in this case the collision process of a photon with a moving free electron does not obey to the laws of the conservation of the energy and a momentum one may come to the conclusion that the moving free electrons cannot absorb the photons.

The photons created by the nuclear reactions and decay of nuclei are called gamma quantum. Despite of the fact that their energy (0.1 to 100 MeV) is much greater than the photon energy of the light beam, they don't lose their wave properties. When interacting with the matter those photons are involved in the three processes as the photoelectric effect, coherent scattering and the production of the electron - positron pairs [4]. In these conditions the low energy quanta leads to the phenomenon of the photoelectric effect and the photon spends all its energy on the interaction with the bound electron. Only in the case where obtained electron energy will be greater than its binding energy with the atom the electron leaves the atom and the phenomenon of the photoelectric effect will occur. Denoting the excess energy as W, we will express the law of the conservation of the energy the corresponding to this case by the following equation:

$$h\nu + m_2c^2 - W = \frac{m_0c^2}{\sqrt{1-(\vartheta/c)^2}}.$$

Is seen to be

$$h\nu = \left[\frac{m_0c^2}{\sqrt{1-(\vartheta/c)^2}} - m_0c^2\right] + W.$$

Given that $\vartheta << c$ this expression transforms:

$$h = m_0c^2\left[1 + \frac{1}{2}(\vartheta/c)^2\right] - m_0c^2 + W,$$

or

$$h\nu = \frac{1}{2}m_0\vartheta^2 + W. \qquad (10)$$

It is easy to verify that the last expression is the Einstein equation describing the condition of the phenomenon of the photoelectric effect. From this point of view it is possible to analyze many aspects of presentation of the phenomenon of the photoelectric effect and thereby to quicken interest of the pupils to Physics and Physical phenomena.

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SECTION 31. Economic research, finance, innovation, risk management.

ORGANIZATION OF ACCOUNTING AND COST ANALYSIS OF PROVISION OF CARS

Abstract: *The article revealed issues of organization of accounting and analysis of the cost of providing services of cars. Classification of costs and methods of accounting and calculation. The results of the operations depend on the information that they use for planning, monitoring and control of management, and support decision making. The main criterion for effectiveness of the system is the efficient management of financial and human resources. Managerial Accounting provides the necessary information for this framework and mechanism for the implementation of this task.*

Key words: *organization, analysis of costs, management accounting, costs, vehicles.*

Language: *English*

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Management accounting is an area of expertise that are in demand by all involved in entrepreneurial activity in order to achieve the goals of their administration or the owner of the organization. The results of the activities depends on the information that they use for planning, monitoring and control of management, as well as support decision making. The value of this account is to systematically consider issues within the organization of operational planning, control and accounting of certain types of activities. The main criterion for the effectiveness of the system is the effective management of financial and human resources, and management accounting provides this essential information base and the mechanism of realization of this task.

Management is a kind of the accounting "rules of the game", developed individually for each company with all the features of its functioning. Among the characteristics of management accounting are the following: efficiency in the provision of management information; preparation of weekly and sometimes daily reports; the possibility of detail of information to the extent that the benefits of the information received is higher than the cost to develop it; analysis of the fait accompli of economic activities and planning for the next reporting periods. [1]

A significant role in managerial accounting is given account of costs and cost of goods (works, services). The success of the issue , and even the continued existence of economic entities are directly dependent on the feasibility of produced costs that need to be taken into account and must be promptly analyzed in order to reduce them. Therefore it is necessary to disclose the nature and content of concepts such as costs, expenses and costs.

These issues, along with issues of cost classification and methods of accounting and calculation will be discussed below. There will also be an objective necessity justified the feasibility of selection as an object of study accounting and analysis of transport and forwarding services costs, and will also be formulated approaches to the identification of the place and role of transport companies in the area of the national economy in the new conditions of its functioning.

In contrast to Marx's theory of marginalizes theory traditionally distinguishes four groups of factors: land, labor, capital, entrepreneurial activity [2].

The main differences between the two systems are as follows:

- Marxism is based on the fact that the factors of production as an economic category determined by the social orientation of production. Already in the original basis of the production process formed the class composition of society and the need for class struggle for "justice."

Marginalizes also consider factors such as the general technical and economic elements without which the production process is unthinkable ;

- Marginalizes under capital assets and understand the subject of work, and the natural conditions of release in a special fund. Marxists combine natural conditions , the means of labor and objects of labor in a single real factor ;
- If marginalizes recognize entrepreneurship as a factor of production, the Marxists deny it.

In general, the difference in the classification of the factors of production is mainly due - class approach to the analysis of natural production. In economic theory, post-industrial society as factors of production are allocated and environmental information. Both are closely linked with the achievements of modern science, which itself acts as an independent factor, as it has a decisive impact on the level of production efficiency, the process of preparing a skilled workforce, and improving human capital and capabilities. [3]

Modern economic theory under the cost understands "the monetary value of the costs of production factors necessary for the implementation of enterprise production and business activities related to the production and sales of products and provision of services, that is all, what it costs to the enterprise product production and sales (products)."

The relationship between the costs and expenses shown in the diagram (Shmalenbah) .

Under neutral expenditure understand the costs, which do not meet any costs , they are divided into three categories :

- not related to this enterprise , characterized by the fact that the cost of consumption is not at all to do with the production of the final product (e.g., donations) ;
- extremely costs are then , if they arise as a result of the production of the final product , but are so extreme that they can not be included in the cost , otherwise the cost of the period due to unexpected costs arising consumption will increase in the future can not be the basis of any planning for prices or to calculate prices or to establish the lower boundary of the price ;
- neutral costs that are caused by assessing the implications, if the expenses are greater than the amount of expenses based on their nature. This is the case when, for example, the amount of depreciation for financial accounting depreciation above, taken into account in management accounting. This is due to two reasons: either does not match the term of the fixed assets for management and financial accounting purposes, or basis for determining the depreciation is the cost of the original purchase (financial accounting) or the cost of a new purchase. Additional costs may arise in connection with the following circumstances: [4]
- patent for services available to an entrepreneur the factors of production are not considered as expenses, as an entrepreneur (sole proprietorship or partnership) does not pay himself a salary for their work and for the use of the equity interest is compensation is contrary part of the profits.

The preparation of these funds are fully using the profits, not costs. In managerial accounting, as opposed to the wage (for individual companies and partnerships) and participation in the capital shall be included in the cost.

In the manufacture of products and provision of services must take into account not to periodically arising losses due to risky transactions in management accounting is carried out by means of calculation taking into account the risk premiums. Thus, there is "periodization costs", which do not occur periodically. In the period when there is no loss due to the risk, and no costs accrued risk premiums are in full incremental costs. If there is a loss on such transactions, it is recognized as extraordinary expenses and not taken into account in management accounting.

Just as in the case with neutral charges have additional costs (costs accrued types that exceed the related costs), together with cost. Take, for example, the case where the financial accounting period of the fixed assets is greater than the internal data of the company for the purpose of management accounting.

For example, the depreciation charge for the purposes of the balance sheet amount to DM 1 000.00 per year, and for internal accounting DM 1 500,00, in this case, the additional costs would amount to DM 500,00. Furthermore, the controversial issue discussed by German scientists is a necessary economic sense to invest in the concept of "cost." Within the delineation of the payment terms, costs and expenses allocated cost approach to the definition of "cost" . Along with the treatment of the value of the concept of costs in the economic literature of Germany, there is a different approach to the determination of costs. The basis of the terminological differences of concepts is that different authors pursued in determining the goals and concepts of unequal choose different theoretical background for his argument. On this basis it is not surprising that there are many interpretations of the term. [5]

We believe this is the most comprehensive definition, while making three significant observations on this concept:

- It must necessarily go consumption property. At the same time a property is necessary to

understand all the available valuation used objects, not just real estate, services and rights, but also nominal assets such as money or loan amount of financial capital. In addition, the use is understood not only as a physical consumption of raw materials, but as productivity and utilities, the space-time use of the means of production and rights. To use property rank as well as the payment of official fees, in particular taxes. We are talking about the consumption of property in the general sense of the word , if the property in accordance with its participation in the process of production of the final product is completely or partially loses its properties , so that you can use to overcome the problems alternatively implemented ;

- Consumption property must apply to the manufacturing process. Not every property consumption is a matter of cost accounting, and only required for manufacturing purposes and assess the results and production organization to maintain productivity. For example, for the main purpose of the brewery - beer production and sales. At the shoe factory main purpose is defined in the proposed range of footwear. Costs considered only a consumption of this terminology, which will inevitably arise in the implementation of the main objectives. If this is not close to the target, ie, the costs do not arise in the performance of production targets, the question of costly nature of such expenses is not. In this case we speak of non-productive expenditure.
- Need valuation consumption. This observation is different from that in the first two signs of the level. If the first two specifies that should be taken into consideration relating to the production process of the product consumption. Third - how to embrace and reflect the economic sense of the real use ', the value of money.

Relating to the production process of property consumption should be reflected in monetary terms, as the heterogeneous levels of consumption can not be directly added together.

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SECTION 21. Pedagogy. Psychology. Innovation in Education.

MAIN AREAS PEDAGOGOMETRIC MATHEMATICAL MODELING EDUCATIONAL PROCESS

Abstract: *The main directions of mathematical modeling pedagogometric the educational process on the basis of a synergistic approach to the process of identity formation, set the basic heuristic potential synergistic approach to the analysis of education-enforcement process in terms of information and communication online media, as well as the use of the twelve pointed star Ertsgammy as a leading formative processes relative-enforcement hyperspace of life, as well as psychological and pedagogical activity theory, psycho-pedagogical system analysis and the theory of the formation of mental actions.*

Key words: *pedagogometric mathematical modeling, pedagogometric, consistency, integrity, the subject of activity, personality analysis, star Ertsgammy, educational space.*

Language: *Russian*

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ОСНОВНЫЕ НАПРАВЛЕНИЯ ПЕДАГОГОМЕТРИЧЕСКОГО МАТЕМАТИЧЕСКОГО МОДЕЛИРОВАНИЯ ОБРАЗОВАТЕЛЬНОГО ПРОЦЕССА

Аннотация: *Рассмотрены основные направления педагогометрического математического моделирования образовательного процесса на основе синергетического подхода к процессу формирования личности, устанавливаются базисные эвристические возможности синергетического подхода к анализу образовательного процесса в условиях информационно-коммуникативной интернет-среды, а также применение двенадцати конечной звезды Эрцгаммы в качестве ведущего формообразовательного процесса относительно гиперпространства жизнедеятельности, а также психолого-педагогической теории деятельности, психолого-педагогического системного анализа и теории формирования умственных действий.*

Ключевые слова: *педагогометрическое математическое моделирование, педагогометрика, системность, целостность, субъект деятельность, личность, анализ, звезда Эрцгаммы, образовательное пространство.*

Педагогометрическое математическое моделирование учебного процесса отражает общее направление автоматизации образовательных технологий, направленных на совершенствование базисной, фундаментальной и широкопрофильной подготовки специалистов, которые должны ориентироваться в общей структуре производства, совокупности методов его самоорганизации и этапах формирования профессионального мастерства.

Педагогометрическое математическое моделирование учебного процесса связывается с современным этапом развития науки в целом, характеризующимся интеграционными процессами и сопровождающимся парадигмальными сдвигами, что связывается с функцией освоения синергетического подхода в отечественном обществознании в форме становления теории самоорганизации [1] .

К настоящему времени сложилось широкое междисциплинарное направление, объединяющее

представителей естественно-научного и социально-гуманитарного знания, связанного с развитием синергетики и многомерности ее приложения. Возникающий синергеанализ социальных процессов, с трансформаций в системе образования и социальном управлении, коэволирует человека и природу. Основные положения синергетики, как теории развития сложных систем в их целостном представлении, устанавливают базисные эвристические возможности синергетического подхода к анализу образовательного процесса в условиях информационно-коммуникативной интернет-среды.

В современных условиях социология накопила значительный объём знаний по проблемам моделирования социальной динамики, ведутся разработки по общей методологии построения социолого-математических моделей, как инструмента исследования социальных и образовательных процессов. В социолого-математических моделях раскрывается сложность, многомерность, многоуровневостъ, многокомпонентностъ, открытость, целостность и динамичность образовательного процесса через синергетический анализ развития учебной деятельности [15].

В этом случае математическое моделирование, как создание модели — образа оригинала, выражается в изучении образовательного процесса с помощью реализуемых на компьютерах вычислительно-логических алгоритмов. При этом важно учесть, что адекватность моделирования социальных процессов обязана математически отображать материальную и духовную составляющую. Это выразилось в идеи двойственности и симметрии с учётом альтернативности, необратимости, неустойчивости и рефлективности, как особенности социальных процессов. На языке высоко абстрактной математики это представляется понятиями — категорий и фунторов.

Образовательный процесс, развитие устойчивой пары «учитель-ученик», рассматривается на основе идеи двойственности и симметрии. В разрабатываемых моделях системы общественного воспроизводства выделяются десять уравнений для определения показателей центрической модели. Для моделирования образовательного процесса, как самореферирующей системы при моделировании сознания и рефлектирующих функций, требуется отображение удвоенного признакового пространства - надстройки. Необходимость учёта рефлективности и историчности образовательного процесса связывается с развитием моделирования основанного на цепях Маркова.

В математическом моделировании образовательного процесса указывается на необходиость: проводить учёт параметров информационно-когнитивной составляющей, как элементов морфогенетических, так и трансмутационных изменений, направленных на введения социальных переменных в модель системы общественного воспроизводства; учёта учебных навыков в качестве независимого третьего аргумента образовательной функции, такой же кумуляты, как знания и умения.

Поэтому существуют базовые математические модели образовательного процесса относительно информационно-энтропийного подхода к отображению нелинейности — для морфогенетических моделей, а также сложности — для репродуктивных моделей — на разных этапах моделирования.

Педагогометрическое математическое моделирование учебного процесса связывается с совершенствованием качества образования. При этом в основе проектирования образовательного процесса используют алгоритм информационно-математического моделирования, когда математическое моделирование проводится в соответствии с технологической моделью уровня личностных достижений обучаемого. Для эффективного управления и математического моделирования обучения применяют комплексы прикладной математики и кибернетики [2] .

Одним из направлений математического моделирования организации учебного процесса является использование методов теории графов и линейной алгебры. Для установления факторов, влияющих на систему организации учебного процесса, применяется метод экспертных оценок. При разработке методики контроля за качеством обучения используются методы математической статистики. В решении задач оптимизации учебного процесса применяют методы линейного программирования.

В целом, при математическом моделировании, учебный процесс представляется в виде структурного графа, позволяющего анализировать взаимосвязи между различными параметрами влияющими на обучение студентов. На основе структурного графа анализируется математическая модель организации учебного процесса в виде системы линейных алгебраических уравнений, где в качестве коэффициентов выделяются весовые показатели параметров учебного процесса. С помощью методов математической статистики устанавливаются среднестатистические показатели, влияющие на качество обучения [16] .

Дальнейшее математическое моделирование учебного процесса связывается с разработкой

авторских инструментальных сред, позволяющих моделировать процессы интерактивного обучения, создавать образовательные информационные ресурсы в автоматизированном режиме, в том числе их мета-описания в соответствии с международными стандартами. Это позволяет применять методы прикладного системного анализа, CASE-технологий; методы построения формальных моделей бизнес-систем, математического аппарата раскрашенных сетей Петри, цепей Маркова; методологии педагогического проектирования.

В целом, это позволяет рассматривать информационную модель жизненного цикла образовательного информационного ресурса с учетом этапа педагогического математического проектирования. При этом разрабатывается и исследуется модель динамики процессов жизненного цикла образовательного информационного ресурса на основе формализмов сетей Петри и цепей Маркова [3] .

На основе теории цепей Маркова разрабатывается стохастическая модель управления этапами жизненного цикла образовательного информационного ресурса, учитывающая время создания и общую стоимость информационного ресурса. Новый подход к моделированию и проектированию образовательного информационного ресурса, отличается от общепринятого тем, что в стандартную методологию проектирования образовательного информационного ресурса, как информационной системы, включены функции математического педагогического проектирования.

Дальнейший анализ результатов математического проектирования образовательного процесса связывается с более широким использованием методов математической статистики для обработки информации, получаемой в результате проведения педагогических образовательных процессов, которые учитывают вероятностный характер педагогических явлений, а также многофакторность педагогической среды и вводят в практику математического моделирования методы выборочных обследований [4].

Выделенные направления педагогометрического математического моделирования образовательного процесса отражают проблемы развития педагогометрического анализа.

Эффективность формирования педагогометрической математической модели целостно-системного цикла учебной деятельности определяется дальнейшим развитием психологической теории деятельности, психолого-педагогического системного анализа и теории формирования интеллекта [5,6].

Синергетическое развитие выделенных проблем связывается с построением физико-математического образа базисных образовательных задач задач. Можно рассматривать любые формы представления данных процессов: от механических до оболочных технологий, однако механическая модель позволит лучше представить установленные закономерности [12,13,14] .

Количественный анализ числа структурных элементов гиперпространства целостно-системных циклов жизнедеятельности, структурных элементов циклических процессов жизнедеятельности, психолого-педагогического системного анализа, теории формирования интеллекта указывает на конкретную определённость этой меры – двенадцать (12) элементов. В целостно-системном цикле жизнедеятельности выделяются следующие целостно-системные элементы: от начального субъекта до супер-субъекта, который открывает последующий цикл развития субъекта жизнедеятельности [7,8].

Элементарное гиперпространство целостно-системных циклов жизнедеятельности представляется двенадцатилучевой звездой Эрцгаммы, элементами которой являются: ориентировочная жизнедеятельность, исполнительная жизнедеятельность, контрольная жизнедеятельность, ориентировочная деятельность, исполнительная деятельность, контрольная деятельность, ориентировочное действие, исполнительное действие, контрольное действие, ориентировочная операция, исполнительная операция, контрольная операция.

Количественное представление психолого-педагогического системного анализа также актуализирует двенадцать (12) системных действий: от выделения объект изучения как систему до представления прогноза развития объекта. Выделенная совокупность системных действий составляет определённую «Азбуку Жизни» [9].

Анализ базисных основ теории формирования интеллекта в условиях целостно-системной жизнедеятельности устанавливает двенадцать (12) этапов формирования интеллекта: от целостно-системная ориентационности до це-лостно-системная духовности [10].

Совместное сочетание теории гиперпространства целостно-системных циклов жизнедеятельности, психологической теории деятельности, психолого-педагогического системного анализа и теории формирования интеллекта в различных соотношениях создают разнообразные формы и структуры

жизнедеятельности, соответствующие им системы воспитания и образования, а также результаты данных процессов: от индивидуума до личности; от «частичного» специалиста до широкопрофильного. Ведущим глаголом учебно-профессиональной деятельности можно считать крутить (ученика) в зависимости от условий образовательного пространства [11].

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SECTION 31. Economic research, Finance, innovation, risk management.

THE ROLE AND SIGNIFICANCE OF ACCOUNTING POLICIES IN THE ACCOUNTING SYSTEM OF THE COMMERCIAL ORGANIZATION

***Abstract**: The article considers the main issues of the entity's accounting policies, its role and importance as the basic document for the regulation of the activities of the enterprise. The basic concepts of creating accounting policy on the basis of existing legal acts and experience of activities of commercial organizations.*

***Key words**: accounting policies, accounting, management.*

***Language**: Russian*

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РОЛЬ И ЗНАЧЕНИЕ УЧЕТНОЙ ПОЛИТИКИ В СИСТЕМЕ БУХГАЛТЕРСКОГО УЧЕТА КОММЕРЧЕСКОЙ ОРГАНИЗАЦИИ

***Аннотация**: В статье рассмотрены основные вопросы сущности учетной политики, ее роль и значение как основного документа для регламентации деятельности предприятия. Определены основные концепции создания учетной политики на основании существующих нормативно-правовых актов и опыта деятельности коммерческих организаций.*

***Ключевые слова**: учетная политика, бухгалтерский учет, управление.*

Сразу после создания коммерческого предприятия и определения руководства, первым внутренним распорядительным документом в организации, издается приказ «Об учетной политике предприятия». Данный документ является основой, так называемой «настольной книгой» для ведения хозяйственной деятельности предприятия и ее отражения в бухгалтерском учете. От того, насколько приемлемо и законно сформирована учетная политика предприятия, зависит самый главный результат деятельности любой коммерческой организации – получение прибыли.

Изучением данного вопроса занимались такие ученые как Опальский А.И., Бусыгина Ю.В., Овчинникова И.В., Буйвис Т. А., Лычагина Л.И., Пальчикова Е.С., Никонова И.Ю. и др.)

Целью статьи является определение сущности учетной политики, анализ ее значения и обоснование необходимости тщательного разработки для эффективной работы предприятия.

В большинстве развитых стран с рыночными отношениями умело сформированная учетная политика используется как составляющая общего механизма управления хозяйственной деятельностью предприятий. По нашему мнению, именно этот документ должен иметь управленческое направление и усилить учетно-аналитические функции в бухгалтерском учете[18].

Приказ об учетной политике организации влияет на окончательный результат экономической деятельности компании, на формирование ее прибыли/убытка. Данному приказу присущи следующие основные признаки:

– соблюдение определенных правил принятия данного документа;

– документальная форма;

– определение способов оценки и условий их реализации [6].

К созданию учетной политики предприятия, необходимо подойти со всей ответственностью, предусматривая все аспекты планируемой

деятельности организации. Существующий нормативно-правовой документ в законодательстве РФ, а именно ПБУ 1/2008 «Учетная политика организации» утвержденный приказом Министерства финансов Российской Федерации от 06.10.2008 № 106н – раскрывает лишь общие положения по формированию учетной политики[2]. Для каждой отдельной коммерческой организации пункты учетной политики составляются в индивидуальном порядке, что зависит от множества факторов.

Мы считаем, что при формировании учетной политики предприятие согласно ПБУ 1/2008, руководители должны учитывать факторы, связанные с формой собственной, организационно-правовым статусом предприятия, действующей системой налогообложения, техническим оснащением управления, эффективностью системы информационного обеспечения предприятия, квалификацией персонала, системой материального поощрения и организацией труда, а также различными аспектами финансово-хозяйственного развития

Таким образом, грамотное ведение учетной политики способствует устранению неточностей в финансовой отчетности. Особенно это актуально для крупных предприятий с разветленной филиальной системой.

Особое внимание стоит обратить на то, что составляя учетную политику необходиом в первую очередь опираться на законодательную и нормативную базу, а затем на профессиональные понятия и опыт.

В результате проведенного исследования был выявлен ряд проблем, возникающих на всех стадиях формирования учетной политики предприятия. Одна из них – это ограниченность законодательного обеспечения в данном вопросе. Данная проблема имеет два проявления. Первое – это невозможность решения большого количества вопросов с помощью учетной политики. Второе это то, что из-за отсутствия рекомендаций по отражению в отчетности конкретных хозяйственных операций, решения, принимаемые по данным операциям, имеют субъективный характер. К таким ситуациям можно отнести: вопрос коммерческой тайны компании, изменение учетных оценок, отображение положений учетной политики в финансовых отчетах.

Формирование учетной политики на предприятии должно быть поэтапным. Необходимо учитывать на каждом этапе следующие вопросы: определение конкретных задач использования объектов бухгалтерского учета; грамотное изучение факторов, которые будут влиять на осуществление выбора принципов, способов ведения бухгалтерского учета и составления финансовых отчетов; соответствии данных принципов и методов условиям деятельности предприятия и запросами пользователей отчетной информации; и наконец, оформление данной учетной политики в соответствии с требованиями законодательства и учредительных документов[15].

Кроме того, при формировании учетной политики важно использовать проектные материалы бухгалтерского учета, то есть графики документооборота, должностные инструкции, планы по организации бухгалтерского учета, статистику выполнения этих планов.

Конечная цель учетной политики состоит в том, что бы избранные способы ведения бухгалтерского учета обеспечили качественный учетный процесс и отражали полную и достоверную картину имущественного и финансового состояния предприятия[5].

Основные элементы, которые прописываются в учетной политике это:

– первичное наблюдение за объектами бухгалтерского учета,

–стоимостные измерения материальные и нематериальных активов;

–текущая группировка и итоговое обобщение фактов хозяйственной деятельности предприятия[10].

В учетной политике предприятия должны быть определены следующие элементы учета (Рис. 1.).

Каждый элемент учета, имеет значение для деятельности коммерческого предприятия. Разумеется, данные элементы должны быть определены с учетом воздействия внутренних и внешних факторов на деятельность предприятия[13].

При выборе группировки и оценке фактов хозяйственной деятельности, необходимо спрогнозировать такие факты, которые будут иметь место в организации в ближайший год.

При выборе метода оценки, необходимо помнить, что это прямо повлияет на налогообложение и проанализировать, как будут формироваться расходы предприятия, применяя тот, или иной метод оценки. Например, при росте инфляции, метод средней себестоимости показывает большие затраты предприятия, что минимизирует налогообложение в части налога на прибыль.

Также, немаловажную роль в формировании расходов имеет и выбор метода амортизации основных средств. Необходимо максимально точно определить полезный срок эксплуатации каждого основного средства и степень его участия в хозяйственной деятельности организации.

Рисунок 1 - Элементы учета, отражаемые в учетной политике [13].

Отсутствие документов, подтверждающих факт хозяйственной жизни, грозит организации применением штрафных санкций, поэтому организация документооборота на предприятия должна быть построена таким образом, чтобы без документирования не осталась ни одна операция. Наряду с построением схемы документооборота определяются и должностные лица, которые имеют право подписи тех, или иных документов.

Результаты инвентаризации на предприятии могут выявить серьезные нарушения, которые могут существенно исказить финансовые результаты предприятия. Поэтому необходимо определить порядок, периодичность и сроки проведения инвентаризации, а также порядок определения состава инвентаризационной комиссии.

Рабочий план счетов бухгалтерского учета в учетной политике утверждается с учетом вида ожидаемых операций в организации для детализации элементов учета, что существенно снижает риск ошибок в финансовой отчетности.

Система регистров бухгалтерского учета также должна быть выбрана оптимально в соотношении: полное отражение учетных данных – минимум громоздкости учетного процесса.

Обработка информации подразумевает выбор программного обеспечения для отражения учетного процесса и иные соответствующие способы и приемы ведения учета. Отдельное внимание следует уделить разделу учетной политики для целей налогового учета, так как за отсутствие такого раздела предусмотрены штрафы.

Таким образом, выбор каждого элемента учетной политики играет важную роль для деятельности предприятия и должен быть составлен с учетом требований законодательства и особенностей хозяйственной деятельности организации. Тщательно продуманная учетная политика – это оптимизация налогообложения и отсутствие негативных последствий в виде штрафов, излишних расходов и т.п.

Необходимо улучшать учетную политики, повышая актуализацию и качество процесса ее формирования, в т.ч. в части минимизации рисков наступления банкротства компании [4]. Актуализация учетной политики -это приведение ее в соответствие с изменяющимся законодательством и бизнес процессами. Необходимо своевременно выявлять новые объекты учета, а также методы учета уже

имеющихся объектов. Для повышения качества учетной политики целесообразно повышать ее по таким критериям как полнота информации, объективность оценки, беспристрастность учетной политики, соответствии нормативной базе и учредительным документам, рациональность способов учета. Именно на руководителей предприятия возлагается обязанность формирования и постоянного обновления учетной политики, а также контроля за ее соблюдением.

Научное исследование выполнено под научным руководством Балынина Игоря Викторовича, ассистента кафедры «Корпоративные финансы» Финансового университета при Правительстве Российской Федерации.

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URBANIZATION IN BOSNIA AND HERZEGOVINA: A CASE STUDY OF USKOPALJSKA VALLEY

Abstract: *Urbanization in the Uskopaljska valley had also its development phases as well as the development of economy. In order to avoid hasty conclusions about the achieved level of urbanization, we applied Vrišer methodology. Suburbanization in the Uskopaljska valley was determined using the Vresk methodology of suburbanization. Urbanization of the Uskopaljska valley in recent decades took place in conditions of constant rapid increase in population, except in the last two decades beacuse of war in period 1992-1995.*

Key words: *Bugojno, urban population, industrialization, urban development, deagrarization.*

Language: *English*

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Analysis and evaluation of geoposition represents an important factor for understanding of genesis, development, and function of any kind of area. Geographical position of the Uskopaljska valley has the following characteristics: it is situated in the Northern Hemisphere, in the field with geographic coordinates 43˚51' and 44˚15' North latitude, and between 17˚16' and 17˚51' East longitude. According to data acquired from the meteorological station of Bugojno, this area belongs to pre-mountain moderate continental climate type or, according to Kepen's Climate Classification, this municipality's region is dominated by Cfb climate (moderate warm and wet climate with warm summer), while in the mountain areas especially in the east, northeast and west, is presented Cfc climate as well (moderate warm and wet climate with fresh summer). On high mountain system of Vranica Dfb and ET climate are present. The main hydrographic skeleton of the Uskopaljska Valley area is presented with the Vrbas River and its tributaries.

Political-geographically, the Uskopaljska valley is situated in the state of Bosnia and Herzegovina, the entity of the Federation of Bosnia and Herzegovina, and within it, in the Central Bosnian Canton. Regional-geographically, it belongs to the Mountain-Valley macroregion, and the Upper Vrbas-Pliva mesoregion of Bosnia and Herzegovina. In Uskopaljska valley there are three municipalities: Bugojno (34.559 population), Donji Vakuf (14.739 population) and Gornji Vakuf-Uskoplje (22.304 population). By roads, Uskopaljska Valley is almost equally away from the cities of Banja Luka, Sarajevo, Mostar, and Split (around 140 km). The total length of border of Uskopaljska valley towards the neighbouring municipalities is 259 km and in those borders the Uskopaljska valley around 1.087,2 square kilometers in area. According to the Census 2013 in Uskopaljska Valley lives 71.602 people. [1]

Like many countries around the world, urbanization in Bosnia and Herzegovina is conditioned in the most direct way by development of non-agricultural activities, primarily industry. In accordance with the possibilities of employment in non-agricultural activities, social restructuring of population was intensively conducted. A part of the agricultural population was employed in non-agricultural activities so that their share decreased. The development of industry enabled the opening of a large number of job positions, and a consequence was a large concentration of population and jobs in the centers of work. [2] Industrialization as a spatial process is in connection with the development of productive forces and production relations. From the geographical point of view, it is especially important that industrialization changes affect the spatial distribution of the productive forces. Therefore, there is a whole chain of different processes and phenomena in space, such as the impact of industry on the development of other economic activities,

changing the living conditions of the population, the impact on the development of settlements, creating environmental problems and the need for spatial planning and the like. Thus, industrialization drives contemporary socio-economic development. [3]

The achieved level of urbanization of 49.5% in Bosnia and Herzegovina in 2010 indicates that Bosnia and Herzegovina belongs to the group of countries with a moderate degree of urbanization. Rapid urbanization in the period of 1991-2010 can be attributed to the relatively greater importance of small settlements that are becoming secondary centers in municipalities which is in line with the principles of polycentric development supported by the first generation of municipal spatial plans. [4]

Urbanization in the Uskopaljska valley had also its development phases as well as the development of economy. In order to avoid hasty conclusions about the achieved level of urbanization, we applied Vrišer methodology [5] and in addition to generalized urbanization measures and the share of urban population, we accepted some other indicators of urbanization, in particular: the share of housing in the city, the proportion of the urban population, the proportion of jobs , the share of jobs in the tertiary sector, and the share of the active agricultural population.

From the selection of indicators, it is evident that we were not only dealing with the population in the cities, but also the concentration of jobs, the share of agricultural population that is poorly connected with the city and the share of residential buildings. Indicators were calculated for the three municipalities in the Uskopaljska valley using Ravbar methodology.[6]

Table 1

Degree of urbanization in Uskopaljska valley.

Municipality	A	B	C	D	E	a	b	c	d	e	f	Degree
Bugojno	53.2	48.2	1.7	88.4	55.7	3	2	3	3	2	13	I
Donji Vakuf	50.9	52.6	1.7	87.6	58.4	2	3	2	2	3	12	II
Gornji Vakuf	25.6	32.8	1.8	85.1	54.1	1	1	1	1	1	5	III

A. The share of housing units in the city out of the total number of housing units in the municipality.

B. The share of the population that lives in the city out of the total population of the municipality

C. The share of active agricultural population in the total active population in the municipality

Using the previously mentioned methodology, the municipality of Bugojno is I degree of urbanization within the Uskopaljska valley, because it has a higher than average proportion of all the indicators except for the share of jobs in the tertiary sector. The municipality of Donji Vakuf is II degree of urbanization and the above-average share of jobs in the tertiary sector, while all other variables have been evaluated with two points. The municipality of Gornji Vakuf is in the third place with III degree of urbanization and with only 25.6% of the urban population (Table 1).

Judging by the share of the urban population, the Uskopaljska valley is a moderately urbanized area. According to the census of 1879, there were only 9.8% of the urban population. Already in 1921, that percentage rose to 12.1%, and not until the 1950s did it change significantly, primarily due to the overcoming of agrarian activities. Since the 1950s

D. The share of jobs in the city in relation to the municipality

E. The share of jobs in the tertiary sector in the city in relation to all jobs in the city

a, b, c, d, e - degree of urbanization evaluated by a number of points from 1 to 3

f- sum of all indicators there has been a strong urbanization of the Uskopaljska valley accompanied with industrialization. [7]

The share of the urban population in the Uskopaljska valley in 1953 amounted to 17.7% and a degree of urbanization was still low. In the early 1970s, as a consequence of the present socio-geographical processes, the Uskopaljska valley begins to take on the characteristics of moderately urbanized area which it maintained until today.In 1971, 25.7% of the population of the Uskopaljska valley lived in the city. Up to 1981 this percentage increased to 31.6% and in 1991 to 36.4%. [8]

According to preliminary results of the census of 2013, 45.2% of the population of the Uskopaljska valley. The conclusion is that the share of urban population in the Uskopaljska valley was continuously growing from 1953 to 2013 (Table 2).

Table 2

Share of urban population in Uskopaljska valley, 1961-2013.

Area	1961	%	1971	%	1981	%	1991	%	2013	%
Total Bugojno	24,114	100	31,856	100	39,969	100	46,889	100	34,553	100
Urban	5,453	22.6	9,329	29.3	14,276	35.7	19,078	40.7	16,657	48.2
Total Donji Vakuf	17,104	100	19,983	100	22,301	100	24,230	100	14,655	100
Urban	4,220	24.7	5,513	27.6	7,768	34.8	9,393	38.8	7,702	52.6
Total Gornji Vakuf	16,175	100	19,344	100	22,432	100	25,181	100	22,306	100
Urban	2,465	15.2	3,426	17.7	4,692	20.9	6,625	26.3	7,317	32.8
Total Uskopaljska valley	57,393	100	71,183	100	84,702	100	96,300	100	71,514	100
Total urban	12,138	21.15	18,268	25.7	26,736	31.6	35,096	36.4	31,676	44.3

Urbanization of the Uskopaljska valley in recent decades took place in conditions of constant rapid increase in population, except in the last two decades. This caused the focus of interest to be directed mainly towards residential construction that created the fundamental characteristic of spatial and urban development of cities of Bugojno, Donji Vakuf and Gornji Vakuf. It took place towards the west at the same time as: planning- socially oriented development in the buildings of collective character and the expansion of business activities along the way from Bugojno to Donji Vakuf and Gornji Vakuf. It can be concluded that urban cadastral municipalities of the Uskopaljska valley belong to different historical periods and therefore have various forms, sizes and functions. About 90% of cadastre municipalities have exclusively residential functions, while the remaining 10% have residential and commercial functions (total 50 cadastre municipalities in 3 administrative municipalities). The degree of urbanization of each space reflects the degree of its social and geographical development.

The Uskopaljska valley is in a phase of development in which mainly prevails the proportion of the active population in the tertiary activity sector. It should be noted that the low proportion of the active population in the primary sector, but that the majority of the rural population works in urban secondary and tertiary activities. In this light should be considered an almost equal proportion of urban and rural population in the total population.

If the types of urbanization were separated by the simple model of two variables: the share of the urban population and the share of the agricultural population, while the parameters would be their average values for Bosnia and Herzegovina, then the Uskopaljska valley would have type I urbanization of the municipalities in Bosnia and Herzegovina. The reason is that there is a higher than average proportion of the urban population and the below-average share of agricultural population with regard to Bosnia and Herzegovina. It is characterized by large urban cadastral municipalities and a higher degree of deagrarization. Thus, the Uskopaljska valley is an area which has seen a stronger degree of social and geographic transformation. [9]

Comparing the process of urbanization among the municipalities of the Uskopaljska valley shows that urbanization was most intense in Bugojno. One of the causes of such situation is much more intensive industrialization of Bugojno which has contributed to deagrarization. Basic indicators of the process of socio-economic mobility of the population are the reduction in the total agricultural and active, on the one hand, and the reduction of the rural population on the other side. In other municipalities the same indicators were recorded with the difference that the process in the municipality of Gornji Vakuf runs much slower because of the traditionally agrarian space and the largest share of active agricultural population.

Individual construction was paid a very small community and expert attention, although this construction accounted with over 80% of the total housing construction. Architectural designing, preparing and equipping the ground for the construction of settlements for individual housing were mostly neglected, and the absence of thought routing and construction, especially in cities, is highly visible.

Under the influence of economic power of industry, the municipalities of the Uskopaljska valley have changed its physiognomy by intensive housing construction. In 1971, Bugojno disposed with 6,472 apartments, and since then, primarily thanks to the development of industry, the number was growing rapidly, so that the census in 2013 registered 12,653 apartments.

Since 1971, urbanization has flowed towards earlier planned directions. In Bugojno, it was initially directed to the west, where between Čipuljić and Bugojno was created a housing settlement - the New settlement. In the northern part of the city there have been built many private family houses. Urbanization in the late 1970s and early 1980s reached all the way to the suburban cadastral municipality of Crniče in the south. Out of infrastructure facilities there were built elementary school and a sports court. The process of industrialization in the area of Bugojno

began in the sixties of the 20th century by building a large military industry enterprises "Slavko Rodić". Until that time, the only industry representatives were only few lignite and building stone mines as well as smaller industrial mills. This means that up to the 1960s the municipality of Bugojno had a distinctly agricultural character. In the spatial-territorial terms, it was the territory of only agrarian cadastral municipalities with Bugojno in the center, but also with the initial functional changes.

The most dynamic changes in the period of the strongest industrialization up to 1981 were next to the city and its settlements in the immediate vicinity as well as along the main roads. In this period there was recorded a weak, still insufficient diversification of rural cadastral municipalities manifested by reducing the share of the active population in the primary, and increasing the number of employees in the secondary and tertiary sectors. In the structure of activities over the next 10 years, the primary sector has experienced a real collapse, while there was registered a large increase in secondary and tertiary sectors.

From 1971 to 1981 in the Uskopaljska valley there was built 4,838 new dwellings, which is almost half of all housing built by then. Out of that, there were built 2,012 new dwellings in Bugojno (Table 3). Most new dwellings were recorded within the urban cadastral municipality of Bugojno, then in register units of Bristovi, Crniče, Kandija, Kopčić and Poriče. Residential construction in suburban cadastral municipalities, with the help of soft loans, sharply accelerated. Restructuring of the active population from the primary to other sectors of activity relates mostly to the cadastral municipalities that were previously developed functional capacity, such as those in the immediate vicinity of the town Vesela, Čipuljić, Bristovi, Kandija and with favorable traffic-geographical position of Gračanica, Poriče, Kopčić.

Table 3

Number of built dwellings in Uskopaljska valley, 1971-2013.

Municipality	1971	1981	1991	2001	2013.
Bugojno	6,472	2,012	1,888	782	848
Donji Vakuf	3,769	1,339	940	525	256
Gornji Vakuf	3,339	1,487	1,700	714	660
Total	13,580	4,838	4,528	2,021	1,764

Urbanization of Bugojno, from 1981 to 1991, moved to the north towards Donji Vakuf and to the south towards Gornji Vakuf. It was moving away from the urban center by construction of new housing units, mostly single-family houses. Along with housing there were also erected infrastructure facilities, as well as shops and restaurants. In this period were built 1,888 new apartments. The highest construction of apartments was present in the cadastral municipalities of Bugojno, Bristovi, Drvetine, Kopčić, Kandija, Poriče i Vesela. In the suburban register units, there were exclusively built family houses with basic infrastructure facilities. Bugojno in 1991 had 11,744 housing units. The number of newly built apartments in 1991 was lower for 24 apartmennts in relation to 1981. [10]

Basic conditions of origin and development of industry in Bosnia and Herzegovina in order of importance are: supply of raw materials, industrial policy, labor, market, traffic position, microlocation position, the supply of fuel and energy and other wider or local factors. At the end of the 20th century, industrialization in Tuzla and Zenica has reached a level of over 50%. Industrialization in Bosnia and Herzegovina has affected the distribution of population and population growth.

The industrialization relied on agricultural population and the use of cheap unskilled labor force. After 1991, the economic importance of industry in Bosnia and Herzegovina began to weaken. [11]

The previous socio-economic development of Bosnia and Herzegovina has caused strong concentration of population in cities which caused a demographic impoverishment and depopulation of significant parts of the national territory with the simultaneous disruption of demographic structure and poor socio-economic development. [12]

After the war in the period 1992-1995 and the destruction of a great deal of the housing stock, which is valued at 30% over the next six years, started its reconstruction. In this period in the Uskopaljska valley was built and reconstructed 2,021 apartment, of which 782 in Bugojno. In 2013, the number of newly built apartments in the Uskopaljska valley was 1,764, a decrease of 257 from 2001.. In the postwar period, the largest number of residential units have been built within the city cadastral municipalities of Bugojno, Gornji Vakuf and Donji Vakuf I, and within the suburban cadastral municipalities of Bristovi, Kandija, Vesela, Kopčić, Podgrađe, Bistrica, Dobrošin, Čehajići. [13]

As for the spatial distribution of residential areas, there should be emphasized that the areas

intended for residential purposes are found in all parts of the city of Bugojno. In large parts of the city, residential areas are combined with the other modes of exploitation, while in some primarily peripheral eastern parts, they have only residential character. As the value of land decreases with distance from the center, so residential construction adapted, thus residential areas with buildings were constructed closer to the center of the city, while the residential areas with houses and their lot in the more distant zone.

The highest density of residential buildings in the city of Bugojno is south and west of the commercial zone and next to its edge. In this zone Center II buildings were built as they are touching each other, in blocks of Lamela and Nugle. This zone is dominated by multi-storey residential buildings with a lot of apartments whose height ranges up to 20 floors. Residential zones with buildings occupy much less area than residential areas with family houses, because they occupy only 23.5% of the area under residential areas. Population density in parts of the city where there are residential zones with buildings is far higher than in residential zones with family homes. Population density ranges over 6,000 inhabitant/km², while in the latter about 1,200 inhabitant /km².

In the east of the business zone, where today's local community Vrbas I is placed, planned housing settlement was constructed composed solely of mostly two-story houses. In the immediate environment of the industrial zone in the southwest was built, in the 1970s, a brand new settlement that was named after the local community. Along the road in downtown - Čipuljić, there have been built a completely new settlement. New Settlement was built mostly for the workers of the company "Slavko Rodić". These buildings are in two or three floors. The green areas between the buildings make this part of the city more beautiful. In the city center of the local community Centar II, the old houses have long been demolished and in their place were built new and modern buildings. East of the old square, between the river Poričnica and Terzića II, in the Terzići settlement, there is another residential area, mainly for the construction of family and private houses.

The third area spreads from both sides of the street Sultan Ahmed going from Čaršija to the gas pump in the local community of Centre I. Family homes are built here. Next residential area of family houses was built after the 1970s, north of the other residential area. Larger residential areas with family houses were built in the local community of Gaj in the northwest of the city. A brand new village was built in the 1980s and is still being built with modern buildings. This is the Vrbas settlement located along the river Poričnica south of the city center.

In the city center which covers the streets: Zlatni ljiljani, Kulina Bana, Sultan Ahmed and Dr Wagner, a function of residence is reduced to a minimum. In the street of Zlatni ljiljani, several residential buildings were built, where there are several buildings from the time of the Austro-Hungarian occupation, so it can be characterized as the old part of the city. The buildings resemble one another, and they are mostly two-storey buildings. In this street there is Gymnasium. Towards the edges of the city, the importance of residential functions is increasing. The newer parts of town are distinguished by their appearance and are dominated by buildings with a much larger number of floors. In this zone, the construction is systematically organized and with blocks. A typical example are the places: Lamele, Nugle, Kolonije, and Vrbas Settlement. As for private construction, it is present in the peripheral parts of the city still in the suburbs.

With the growth of the city, the pace of housing construction progressed away from the center, although not equally in all directions, so the average age of the housing decreases with distance from the city center. Of the total number of apartments registered in the territory of the local community Centre in 1991, today there are the local community Centre I and Center II, as much as 95% of apartments were built in the last century, of which almost 50% of dwellings in the period 1946-1970. The gradual transition from the older to the younger residential structures in the longitudinal direction of development towards the cadastral municipality of Čipuljić reflects the continuous and uninterrupted expansion of the city in this direction. In contrast, limited construction areas in the attractive eastern zone of the city, today's local communities of Vrbas I and Vrbas II, were quickly used for residential construction immediately after the Second World War and the expansion of the city was carried out to the north.

The latest residential areas are found on the margins of the formal city, and in the southern parts of local community Centre II where new buildings are being built which is one feature of the town of Bugojno. The latest housing construction occurs in the southwestern part of the local community Centre I, Vrbas Settlement near the Stadium Jaklić, in the aforementioned area. [14]

The average size of an apartment in Bugojno ranges from 43 m², which is the size in the residential area Lamele, 48 m² in Vrbas Settlement, and 41 m² in Nugle in local communities of Center I and II. Other local communities have a greater surface area of apartments because it is mostly individual construction, houses, ranging in size from an average of 70 m² in the local community Vrbas I and Vrbas II up to 82 m² in some residential settlements of local communities Gorica and Čipuljić.

Miniature flats are typical also for new residential areas, especially those resulting from the 1960s and 1970s when the great demand of housing with immigration pressure from outside was affected by strong pressure from the overcrowded city center. In general, the size of apartments, however, increases with distance from the center of the cadastral municipality of Bugojno, except for the new housing settlements in the local community of Novo Naselje and the aforementioned Vrbas Settlement.

From the standpoint of social topography, the average area per person is more interesting than the sheer size of the apartment. In this regard as well, the city core and the southwestern part of the city stand out as the most unfavorable. Comparatively, larger average surfaces are found in parts of the periurban area, and in most parts of the study area (two-thirds of all local communities) that average is of 15 - 20 m² per person. In the central local communities (Center I and Centre II) the average floor area per person is 15.9 m². [15]

Due to a very low population derease in the city center as well as residential suburbanization, that have not yet taken hold of the Bugojno area, density of population is by far the largest in the central local communities, over 6,000 inhabitants / km² and up to 6.5 inhabitants / km² in the peripheral parts of the local communities of Čipuljić, Gorica and Novo Naselje.

So great population density in the central city local communities is the result of a high density of development, while the average living area per person here is in the slightest over the city, as well as the average size of apartments. If you also add the equipment of the apartments with basic elements of urban infrastructure, it follows that the center of the city, although it has the most favourable infrastructure, does not provide the most favorable conditions for housing, despite the growing concentration of people and businesses. Suburbanization in the Uskopaljska valley was determined using the Vresk methodology of suburbanization. To determine the degree of social geographic transformation of cadastral municipalities, especially the impact of the town of Bugojno on the transformation of rural cadastral municipalities, there was made the differentiation of cadastral districts in four categories: urban, more urbanized, less urbanized and rural cadastral municipalities. This differentiation was based on two variables: the share of the agricultural population and the proportion of workers from the active population, while the parameters were determined on the basis of their mutual correlations (Table 4.). [16]

Table 4

Model for differentiation of urbanized cadastral municipalities in Uskopaljska valley.

Degree of urbanization	% agricultural population	% workers from active population
Higher degree	10.0 and less	75.0 and more
Lower degree	10.1-20.0	50.0 and more

According to this model, as a special group were classified cadastral municipalities that do not meet the above criteria. Status of urban cadastral municipality was acquired by the cadastral municipalities with more than 2,000 inhabitants, with less than 10% of the agricultural population and more than 50% of workers in their place of residence if it has fewer than 10,000 residents. The only urban cadastral municipalities under this model are Bugojno, Donji Vakuf and Gornji Vakuf. Only three cadastral municipalities in 1991 were less urbanized, Čaušlije, Čipuljić and Crniče near the town of Bugojno. Other cadastral municipalities are of rural type (Figure 1). It is understandable that the strongest transformation is related to cadastral municipalities around the city and along the roads because it creates related urbanized zones. They are nowadays spread radially from the town cadastral municipalities along the main traffic routes making it the axis of urbanization.

The widest urbanized zone extends around the city of Bugojno making it a complete socio-economic urban region. However, more or less continuous narrow urbanized zones that occur as a shaft of weak urbanization extend from Bugojno along major traffic routes. These and other indicators show that the process of urbanization of the Uskopaljska valley continues with the concentration of population and jobs in the city and there are no significant tendency of decentralization In 2013 the situation in the urbanization of the Uskopaljska valey was very similar with the difference that the cadastral municipality of Čaušlije became rural because there are no more 50% of workers, and there is more agricultural population than 20% (Figure 2).

Differentiation of cadastral municipalities using this model shows that a very small number of cadastral municipalities of the Uskopaljska valley experienced a significant degree of transformation. On the basis of these data on the socio-economic transformation of the cadastral municipalities may be concluded that the suburbanization in the Uskopaljska valley is poorly expressed.

In the near future significant changes are not expected in transformation of rural cadastral municipalities of the Uskopaljska valley.

In the cadastral municipalities of Donji Vakuf I and Gornji Vakuf , there were built mainly private houses, with the difference that in Donji Vakuf there is much larger number of blocks with multi-storey buildings especially in its southern part. In Donji Vakuf, for the development of industry there were built 2,279 apartments in the period 1971-1991, and in Gornji Vakuf 3,187 mostly private in rural cadastral municipalities. Urbanization in the municipality of Donji Vakuf after 1995 is focused on the reconstruction of the former housing and the construction of housing for returnees whose houses were destroyed during the war. There was built 781 apartment. In the same period in the municipality of Gornji Vakuf were built 1,374 apartments, of which the largest number in the city of Gornji Vakuf and cadastral municipalities of Podgrađe, Tihomišlje and Ždrimci.

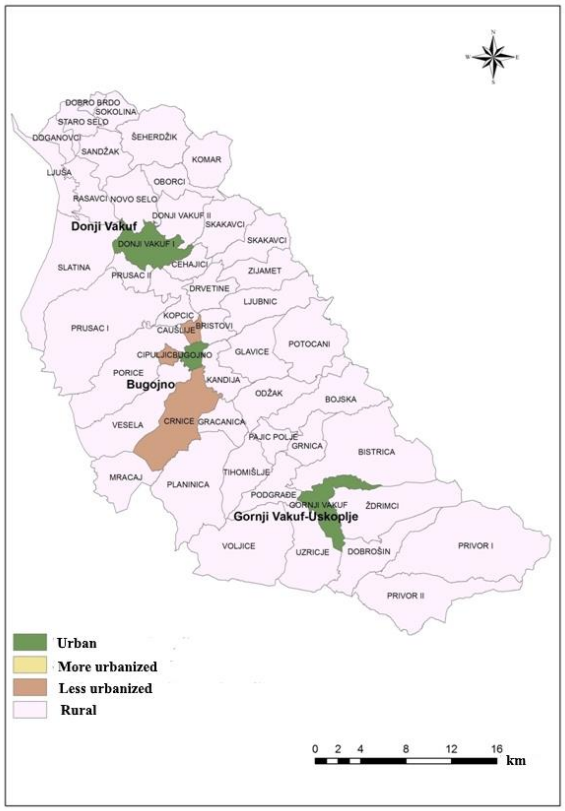

Figure 1 - Degree of urbanization, 1991.

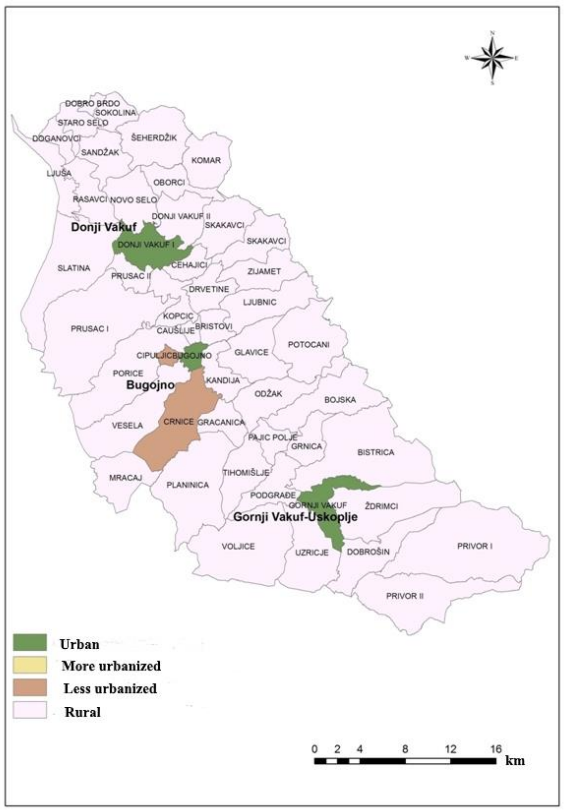

Figure 2 - Degree of urbanization, 2013.

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SECTION 2. Applied mathematics. Mathematical modeling.

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SOME METHODS OF DIFFERENTIATION OF LAYERS IN DELPHI

Abstract: *This article discusses some methods of isolation layers in Delphi, in relation to the geodetic satellite maps.*

Key words: *layer, maps, delphi.*
Language: *English*
Citation: Shevtsov AN (2016) SOME METHODS OF DIFFERENTIATION OF LAYERS IN DELPHI. ISJ Theoretical & Applied Science, 06 (38): 155-165.
Soi: http://s-o-i.org/1.1/TAS-06-38-32 ***Doi***: crossref http://dx.doi.org/10.15863/TAS.2016.06.38.32

Introduction

In a separate geodetic tasks there is the problem of re-projection and allocation of separate cultures (layers) of a satellite map which shows several dozen of crops. [1-7]

Model

Let's will develop a program in Delphi which will work with large amounts of graphical information and will perform the following tasks:

- Load arbitrary map image (Fig.1)
- Re-projection and allocation of the common image block of 100x100 km
- Split into separate layers, and the allocation of each layer
- Save the obtained results

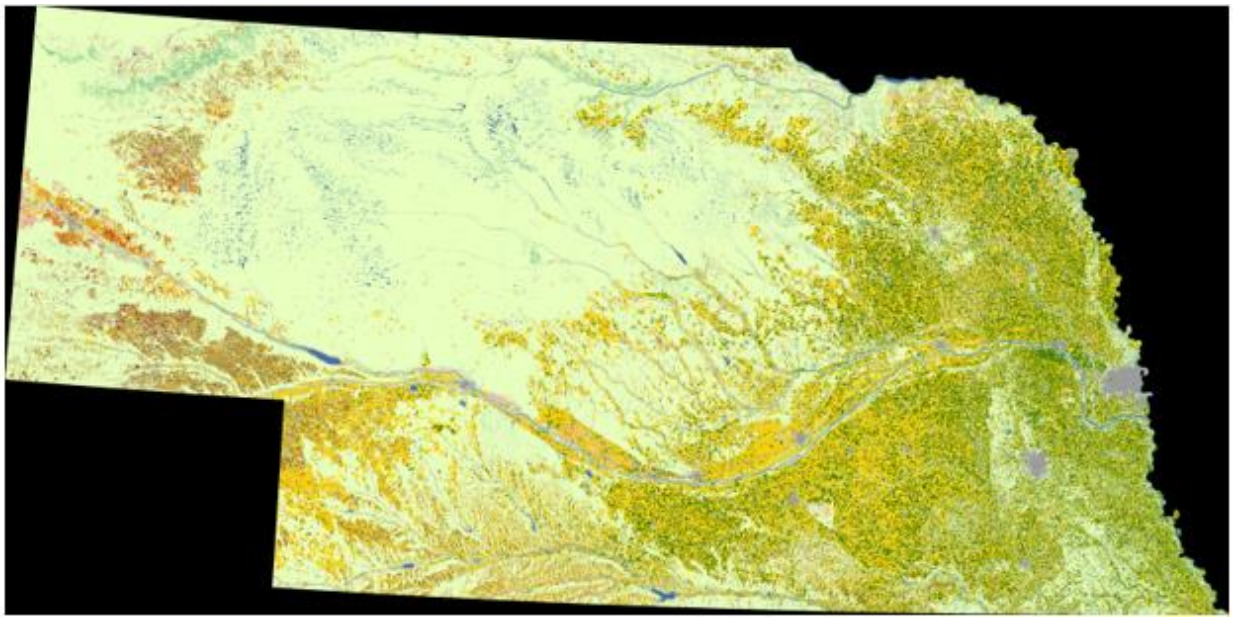

Figure 1 - Original image with all layers.

Materials and methods

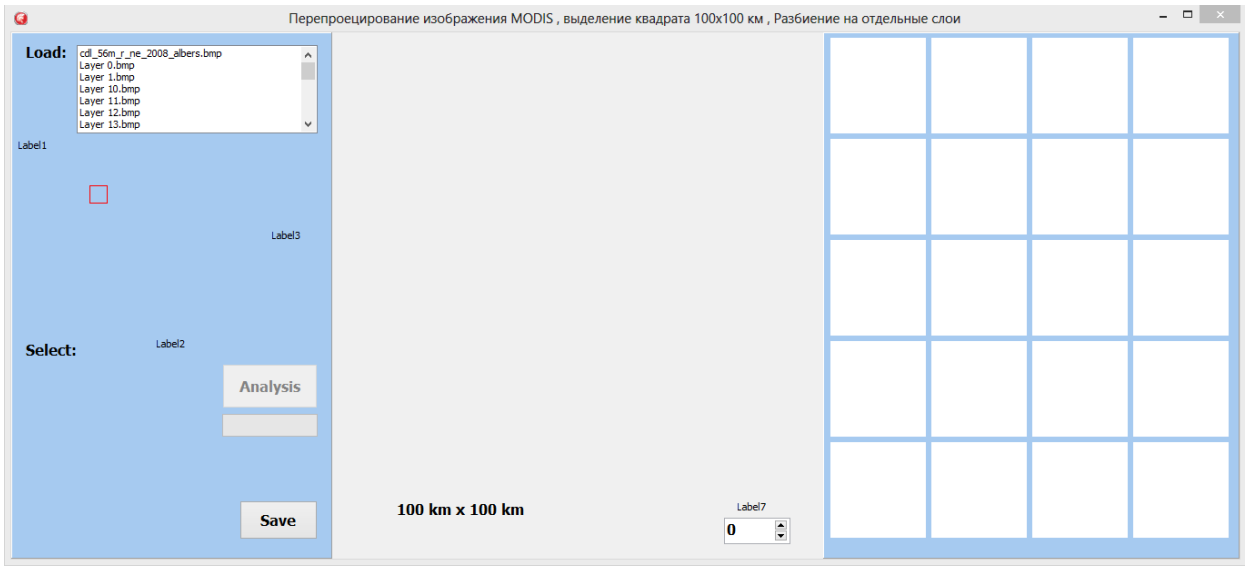

Figure 2 – The form of the program.

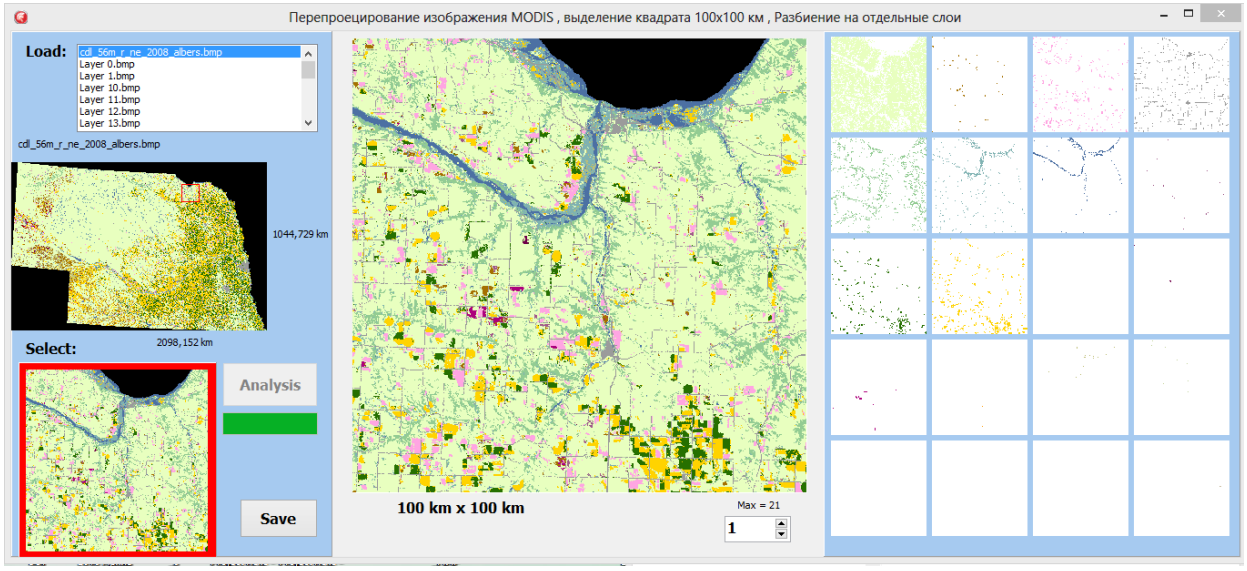

Figure 3 - The selection of layers.

In the program window (Fig. 3), it is possible to select a region on the map size of 100x100 km. Then, the obtained image becomes a separate and stored (Fig.4) Split it into layers occurs through the analysis and selection of certain shades of color. Each individual layer is stored in an array and is displayed on the right panel of the window.

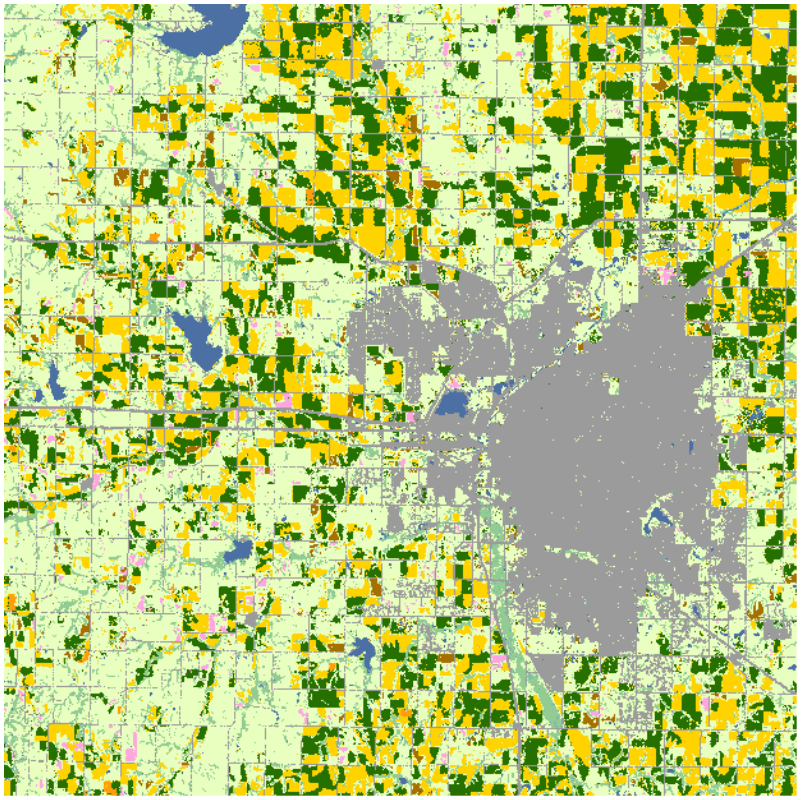

Figure 4 - The resulting image is 100x100 km.

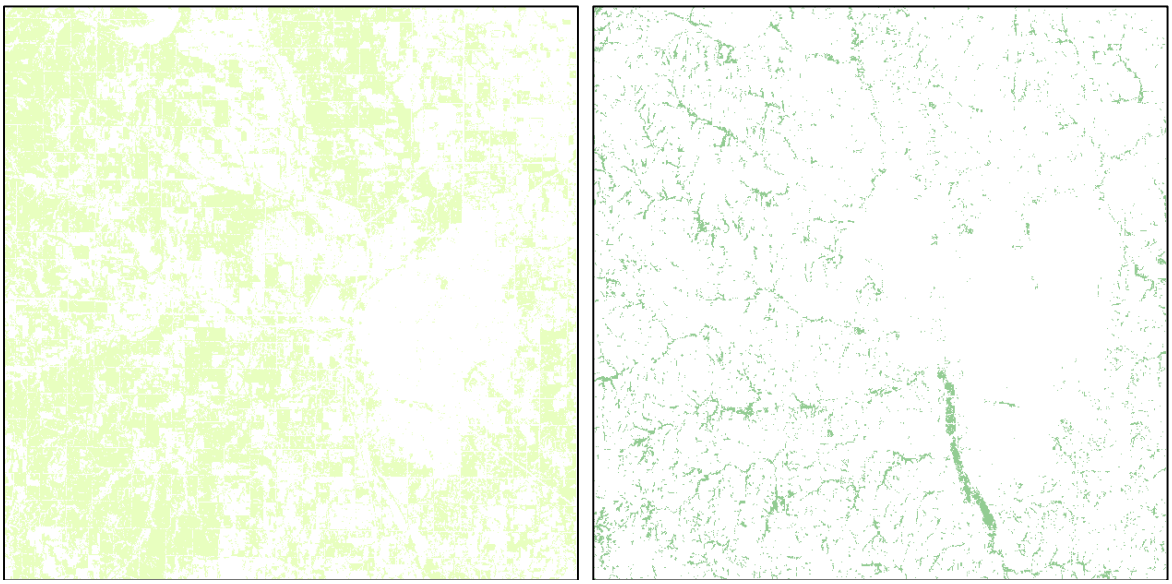

Figure 5 - The resulting layers 1-2.

The resulting layers characterize the crops grown in these areas.

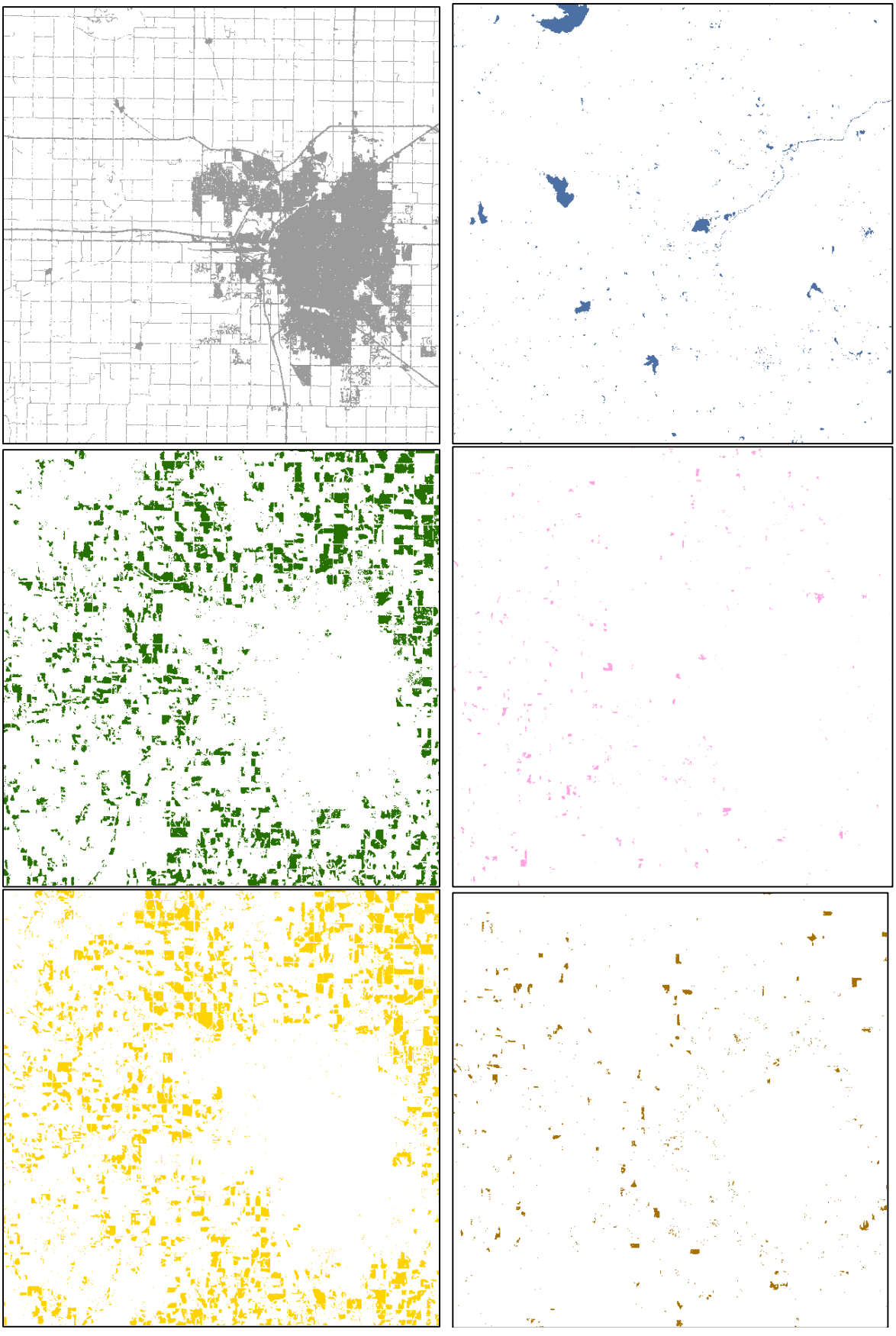

Figure 6 - The resulting layers 3-8.

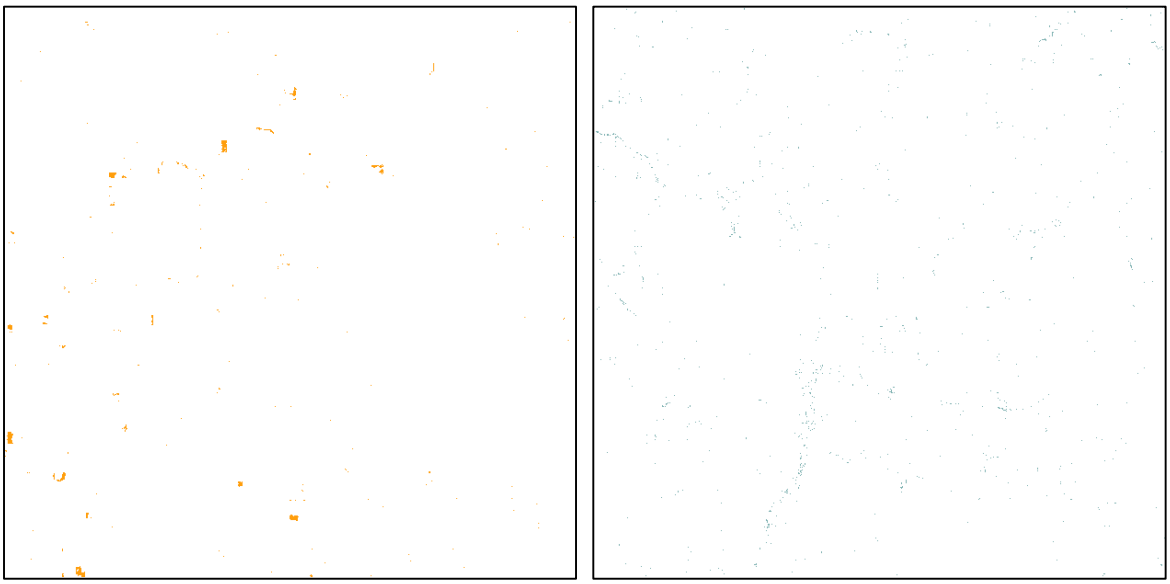

Figure 7 - The resulting layers 9-10.

Results

The developed program allows to quickly and easily select from maps of the area, with a plot size of 100x100 km and divide it into separate layers. The obtained layers can be used to create temporary maps of cultivation of agricultural crops.

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Annex 1

The program in Delphi.

```
unit Unit1;
interface
uses
  Winapi.Windows, Winapi.Messages, System.SysUtils, System.Variants, System.Classes, Vcl.Graphics,
  Vcl.Controls, Vcl.Forms, Vcl.Dialogs, Vcl.StdCtrls, Vcl.FileCtrl, Vcl.ExtCtrls,
```

```
  Vcl.ComCtrls, Vcl.Samples.Spin;

type
  TForm1 = class(TForm)
    Panel1: TPanel;
    Image1: TImage;
    FileListBox1: TFileListBox;
    Label1: TLabel;
    Image2: TImage;
    Image3: TImage;
    Label2: TLabel;
    Label3: TLabel;
    Memo1: TMemo;
    Panel2: TPanel;
    Image4: TImage;
    Image5: TImage;
    Image6: TImage;
    Image7: TImage;
    Image8: TImage;
    Image9: TImage;
    Image10: TImage;
    Image11: TImage;
    Image12: TImage;
    Image13: TImage;
    Label4: TLabel;
    Label5: TLabel;
    Label6: TLabel;
    Button1: TButton;
    Label7: TLabel;
    Image14: TImage;
    Image15: TImage;
    Image16: TImage;
    Image17: TImage;
    Image18: TImage;
    Image19: TImage;
    Image20: TImage;
    Image21: TImage;
    Image22: TImage;
    Image23: TImage;
    Image24: TImage;
    Panel3: TPanel;
    SpinEdit1: TSpinEdit;
    ProgressBar1: TProgressBar;
    Button2: TButton;
    procedure FileListBox1Click(Sender: TObject);
    procedure Image2MouseDown(Sender: TObject; Button: TMouseButton;
      Shift: TShiftState; X, Y: Integer);
    procedure Image2MouseMove(Sender: TObject; Shift: TShiftState; X,
      Y: Integer);
    procedure Image2MouseUp(Sender: TObject; Button: TMouseButton;
      Shift: TShiftState; X, Y: Integer);
    procedure FormCreate(Sender: TObject);
    procedure Button1Click(Sender: TObject);
    procedure FormDestroy(Sender: TObject);
    procedure Image14Click(Sender: TObject);
    procedure Image4Click(Sender: TObject);
    procedure Image5Click(Sender: TObject);
    procedure Image6Click(Sender: TObject);
    procedure Image7Click(Sender: TObject);
```

```
    procedure Image8Click(Sender: TObject);
    procedure Image9Click(Sender: TObject);
    procedure Image10Click(Sender: TObject);
    procedure Image11Click(Sender: TObject);
    procedure Image12Click(Sender: TObject);
    procedure Image13Click(Sender: TObject);
    procedure Image15Click(Sender: TObject);
    procedure Image16Click(Sender: TObject);
    procedure Image17Click(Sender: TObject);
    procedure Image18Click(Sender: TObject);
    procedure Image19Click(Sender: TObject);
    procedure Image20Click(Sender: TObject);
    procedure Image21Click(Sender: TObject);
    procedure Image22Click(Sender: TObject);
    procedure Image23Click(Sender: TObject);
    procedure Image24Click(Sender: TObject);
    procedure SpinEdit1Change(Sender: TObject);
    procedure Button2Click(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;

var
  Form1: TForm1;
  fname:string;
 d:boolean;
i,x1,y1,maxi:integer;
c:array[1..1000]of tcolor;
b:array[0..1000] of tbitmap;
  implementation

{$R *.dfm}

procedure TForm1.Button1Click(Sender: TObject);
var
i,j,k:integer; cc:tcolor;
pr:boolean;
begin
maxi:=0;
for k := 1 to 1000 do
b[k].Canvas.FillRect(rect(0,0,620,620));


progressbar1.Max:=62;
for I := 0 to 620 do
begin
for j := 0 to 620 do
begin
cc:=b[0].Canvas.Pixels[i,j];

pr:=false;
for k := 1 to maxi do
if c[k]=cc then begin pr:=true;    b[k].Canvas.Pixels[i,j]:=cc;
end;
if not(pr) then begin inc(maxi);c[maxi]:=cc;
  end;
end;
```

```
if i mod 10 = 0 then  progressbar1.Position:=trunc(i/10);
end;

label7.Caption:='Max = '+inttostr(maxi);

  image4.Picture.Assign(b[1]);
  image5.Picture.Assign(b[2]);
  image6.Picture.Assign(b[3]);
  image7.Picture.Assign(b[4]);
  image8.Picture.Assign(b[5]);
  image9.Picture.Assign(b[6]);
  image10.Picture.Assign(b[7]);
  image11.Picture.Assign(b[8]);
  image12.Picture.Assign(b[9]);
  image13.Picture.Assign(b[10]);
  image15.Picture.Assign(b[11]);
  image16.Picture.Assign(b[12]);
image17.Picture.Assign(b[13]);
image18.Picture.Assign(b[14]);
image19.Picture.Assign(b[15]);
image20.Picture.Assign(b[16]);
image21.Picture.Assign(b[17]);
image22.Picture.Assign(b[18]);
image23.Picture.Assign(b[19]);
image24.Picture.Assign(b[20]);

spinedit1.MinValue:=1;
spinedit1.MaxValue:=maxi;
spinedit1.Value:=1;
end;

procedure TForm1.Button2Click(Sender: TObject);
var k:integer;
begin
for k := 0 to maxi do
b[k].SaveToFile('Layer '+inttostr(k)+'.bmp');
end;

procedure TForm1.FileListBox1Click(Sender: TObject);
begin
fname:=FileListBox1.FileName;

label1.Caption:=extractfilename(fname);
image1.Picture.LoadFromFile(fname);

label2.Caption:=floattostr(image1.Picture.Width/10*1.61)+' km';
label3.Caption:=floattostr(image1.Picture.Height/10*1.61)+' km';
end;

procedure TForm1.FormCreate(Sender: TObject);
begin
for I := 0 to 1000 do
begin
b[i] := TBitMap.create;
b[i].Height:=621;
b[i].Width:=621;
b[i].Canvas.FillRect(rect(0,0,620,620));
end;
  image4.Picture.Assign(b[1]);
```

```
  image5.Picture.Assign(b[2]);
  image6.Picture.Assign(b[3]);
  image7.Picture.Assign(b[4]);
  image8.Picture.Assign(b[5]);
  image9.Picture.Assign(b[6]);
  image10.Picture.Assign(b[7]);
  image11.Picture.Assign(b[8]);
  image12.Picture.Assign(b[9]);
  image13.Picture.Assign(b[10]);
image15.Picture.Assign(b[11]);
image16.Picture.Assign(b[12]);
image17.Picture.Assign(b[13]);
image18.Picture.Assign(b[14]);
image19.Picture.Assign(b[15]);
image20.Picture.Assign(b[16]);
image21.Picture.Assign(b[17]);
image22.Picture.Assign(b[18]);
image23.Picture.Assign(b[19]);
image24.Picture.Assign(b[20]);
end;

procedure TForm1.FormDestroy(Sender: TObject);
begin
for I := 0 to 1000 do
b[i].Free;
end;

procedure TForm1.Image10Click(Sender: TObject);
begin
image3.Picture.Assign(b[7]);
end;

procedure TForm1.Image11Click(Sender: TObject);
begin
image3.Picture.Assign(b[8]);
end;

procedure TForm1.Image12Click(Sender: TObject);
begin
image3.Picture.Assign(b[9]);

end;

procedure TForm1.Image13Click(Sender: TObject);
begin
image3.Picture.Assign(b[10]);
end;

procedure TForm1.Image14Click(Sender: TObject);
begin
    image3.Picture.Assign(b[0]);
end;

procedure TForm1.Image15Click(Sender: TObject);
begin
image3.Picture.Assign(b[11]);
end;

procedure TForm1.Image16Click(Sender: TObject);
```

```
begin
image3.Picture.Assign(b[12]);
end;

procedure TForm1.Image17Click(Sender: TObject);
begin
image3.Picture.Assign(b[13]);
end;

procedure TForm1.Image18Click(Sender: TObject);
begin
image3.Picture.Assign(b[14]);
end;

procedure TForm1.Image19Click(Sender: TObject);
begin
image3.Picture.Assign(b[15]);
end;

procedure TForm1.Image20Click(Sender: TObject);
begin
image3.Picture.Assign(b[16]);
end;

procedure TForm1.Image21Click(Sender: TObject);
begin
image3.Picture.Assign(b[17]);
end;

procedure TForm1.Image22Click(Sender: TObject);
begin
image3.Picture.Assign(b[18]);
end;

procedure TForm1.Image23Click(Sender: TObject);
begin
image3.Picture.Assign(b[19]);
end;

procedure TForm1.Image24Click(Sender: TObject);
begin
image3.Picture.Assign(b[20]);
end;

procedure TForm1.Image2MouseDown(Sender: TObject; Button: TMouseButton;
  Shift: TShiftState; X, Y: Integer);
begin
d:=true;
end;

procedure TForm1.Image2MouseMove(Sender: TObject; Shift: TShiftState; X,
  Y: Integer);
begin
if d then

begin
image2.Left:=image2.Left+X-10;
image2.Top:=image2.Top+Y-10;
x1:=trunc((image2.Left-image1.left)/image1.Width*image1.Picture.Width) ;
```

```
y1:=trunc((image2.Top-image1.Top)/image1.Height*image1.Picture.Height) ;
memo1.Lines.Add('x = '+inttostr(x1));
memo1.Lines.Add('y = '+inttostr(y1));
b[0].Canvas.CopyRect(rect(0,0,620,620),image1.Canvas,rect(x1,y1,x1+621,y1+621));
  image3.Picture.Assign(b[0]);
  image14.Picture.Assign(b[0]);
end;
end;

procedure TForm1.Image2MouseUp(Sender: TObject; Button: TMouseButton;
  Shift: TShiftState; X, Y: Integer);
begin
d:=false;
panel3.Visible:=true;
application.ProcessMessages;
button1.Click;
end;

procedure TForm1.Image4Click(Sender: TObject);
begin
image3.Picture.Assign(b[1]);
end;

procedure TForm1.Image5Click(Sender: TObject);
begin
image3.Picture.Assign(b[2]);
end;

procedure TForm1.Image6Click(Sender: TObject);
begin
image3.Picture.Assign(b[3]);
end;

procedure TForm1.Image7Click(Sender: TObject);
begin
image3.Picture.Assign(b[4]);
end;

procedure TForm1.Image8Click(Sender: TObject);
begin
image3.Picture.Assign(b[5]);
end;

procedure TForm1.Image9Click(Sender: TObject);
begin
image3.Picture.Assign(b[6]);
end;

procedure TForm1.SpinEdit1Change(Sender: TObject);
var s:integer;
begin
s:= spinedit1.Value;
image3.Picture.Assign(b[s]);
end;

end.
```

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SOME ALGORITHMS BUILD THE BIFURCATION CURVES OF THE LORENZ ATTRACTOR IN MAPLE

Abstract: *Here are investigated some problems of constructing bifurcation curves for the Lorenz attractor on Maple.*

Key words: *Lorenz, maple, bifurcation curves.*
Language: *English*
Citation: Shevtsov AN (2016) SOME ALGORITHMS BUILD THE BIFURCATION CURVES OF THE LORENZ ATTRACTOR IN MAPLE. ISJ Theoretical & Applied Science, 06 (38): 166-191.
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Introduction

The construction of the Lorenz model associated with the forecasting processes, stochastic attractors, turbulence, etc. In fact, the Lorentz model is too simple, not to expect stochasticity in much more complex systems. Bifurcation analysis it was shown that sometimes there is a real opportunity to build a "bifurcation tree," indicating the sequence of the various metamorphoses with the solutions in the parameter space of the system. Thus, it is possible to find a way of appearance of turbulence and build a scenario for its development.[1-12]

Model

Consider the model of the Lorenz attractor:

```
> restart;
  with(plots) :
  with(plottools, line) :
  with(Detools) :
  n := 1000;
  s := 10;
  r := 28;
  b := 8/3;
  x[0] := 5;
  y[0] := 3;
  z[0] := 5;
  t := 0.01;
  for i from 1 to n do
  x[i] := x[i-1] + s·(y[i-1] − x[i-1])·t;
  y[i] := y[i-1] + (x[i-1]·(r − z[i − 1]) − y[i − 1])·t;
  z[i] := z[i-1] + (x[i − 1]·y[i-1] − b·z[i-1])·t;
  od:
  points := {seq([x[i], y[i], z[i]], i = 0 ..n)} :

  pointplot3d(points, axes = boxed);
  spacecurve([cos(t), sin(t), t], t = 0 ..4·Pi);
```

$n := 1000$

$s := 10$

$r := 28$

$b := \frac{8}{3}$

$x_0 := 5$

$y_0 := 3$

$z_0 := 5$

$t := 0.01$

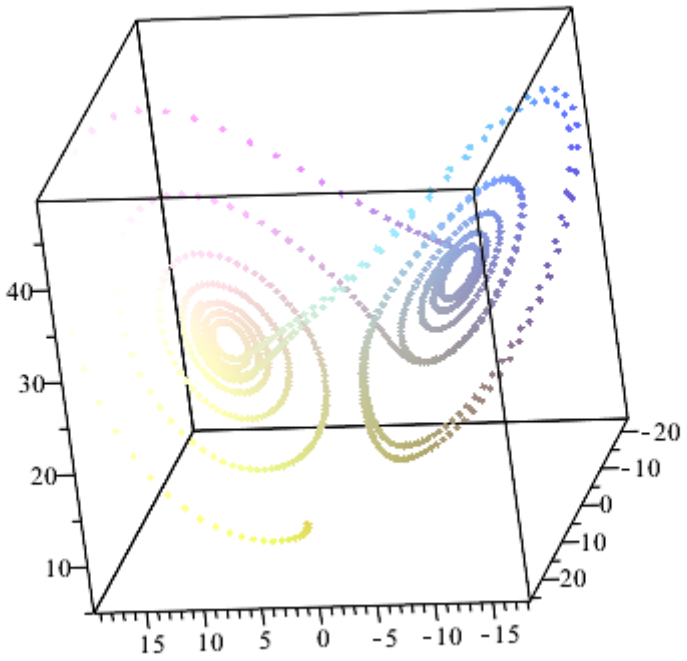


Figure 1 - Model of the Lorenz attractor.

```
> restart;
  with(plots):
   with(plottools, line):
   n := 150;
   t0 := 2.5;
   t := 0.01;
  x[0] := 3.051523;
  y[0] := 1.582542;
  z[0] := 15.62388;

   for s from 10 to 10 do
   for b from 0  to  9 do
  for r from 0   to  9 do
   for i from 1  to n do
    x[i] := x[i-1] + s·(y[i-1] − x[i-1])·t;
    y[i] := y[i-1] + (x[i-1]·(14 + r − z[i − 1]) − y[i − 1])·t;
    z[i] := z[i-1] + (x[i − 1]·y[i-1] − (b/3)·z[i-1])·t;
   od;
    px[100·s + 10·b + r] := {seq([t0 + t·i, x[i]·t], i = 1 ..n)};
   py[100·s + 10·b + r] := {seq([t0 + t·i, y[i]·t], i = 1 ..n)};
   pz[100·s + 10·b + r] := {seq([t0 + t·i, z[i]·t], i = 1 ..n)};

   a[100·s + 10·b + r] := {seq([x[i], y[i], z[i]], i = 1 ..n)}:

  od;
   od;
   od;
```

```
 q1 := 1000;
 q2 := 1099;
for k from q1 to q2 do
c[k] := pointplot3d(a[k], axes=boxed);
ccx[k] := plot(px[k]);
ccy[k] := plot(py[k]);
ccz[k] := plot(pz[k])
od:
 display(seq(c[j], j=q1..q2), color=[red]);
 display(seq(ccx[j], j=q1..q2));
 display(seq(ccy[j], j=q1..q2));
 display(seq(ccz[j], j=q1..q2));
```

$$n := 150$$

$$t0 := 2.5$$

$$t := 0.01$$

$$x_0 := 3.051523$$

$$y_0 := 1.582542$$

$$z_0 := 15.62388$$

$$q1 := 1000$$

$$q2 := 1099$$

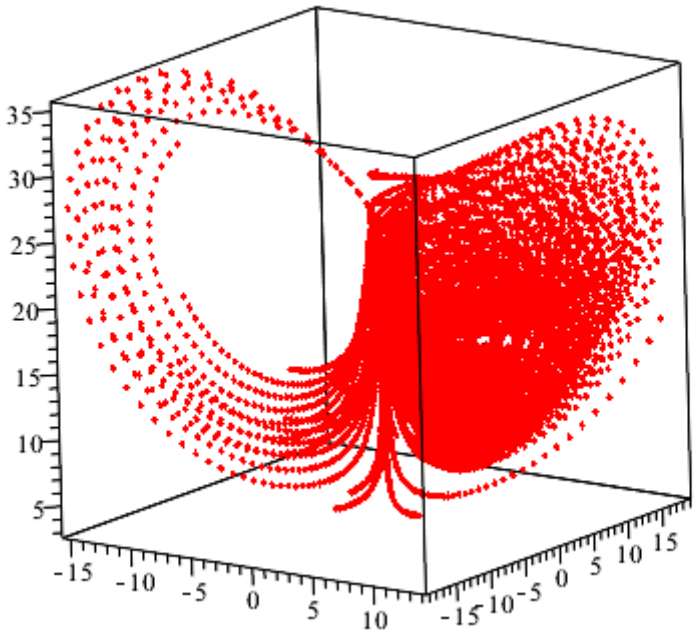


Figure 2 - Model of the Lorenz attractor, r = 0..9, b = 0..9, s = 10.

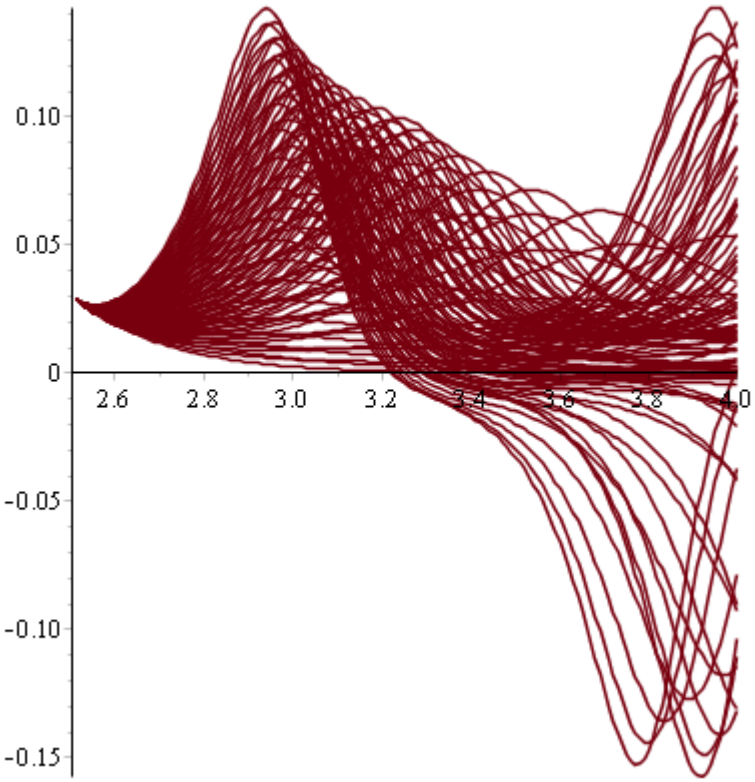


Figure 3 - Bifurcation of the function x[t].

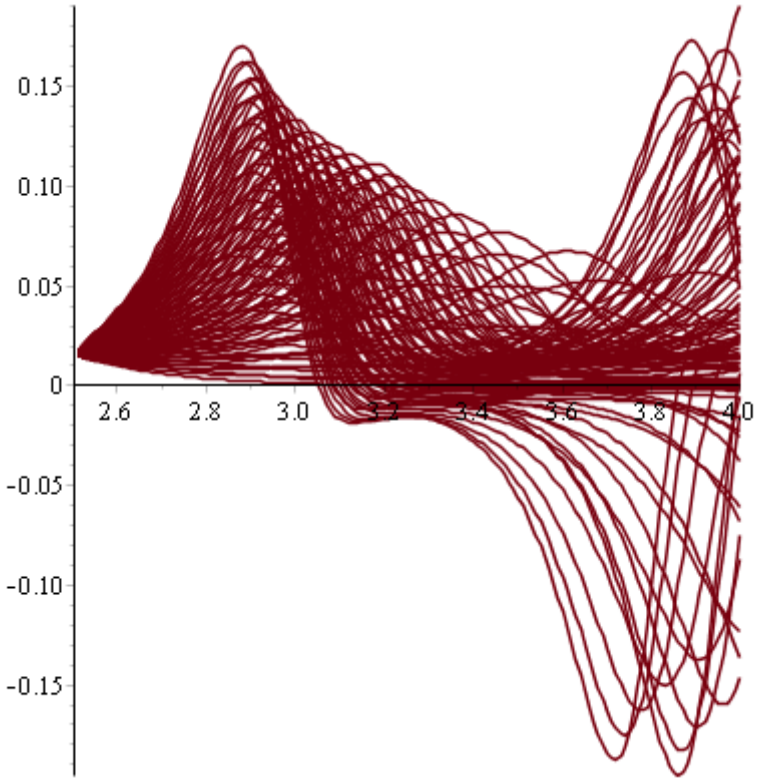


Figure 4 - Bifurcation of the function y[t].

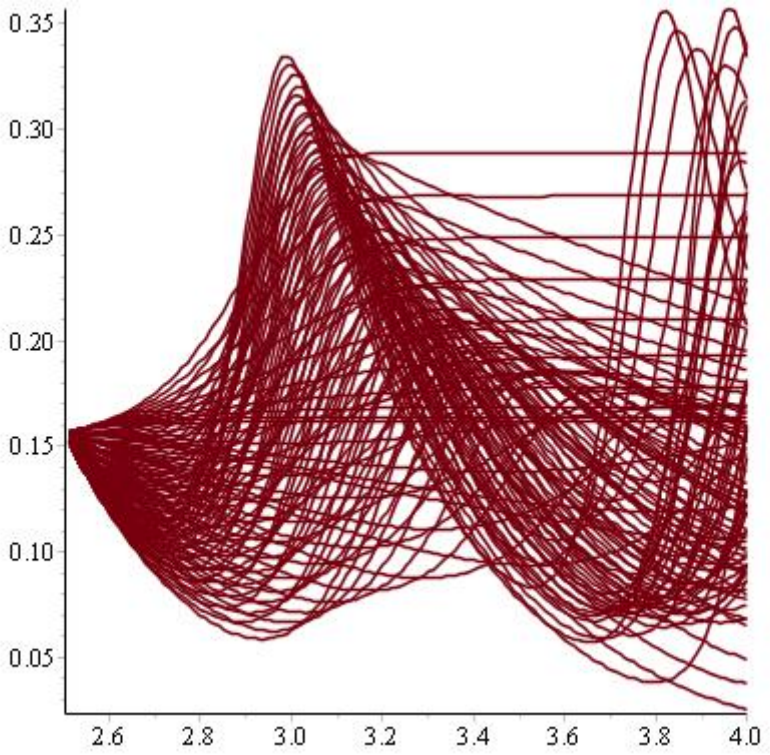
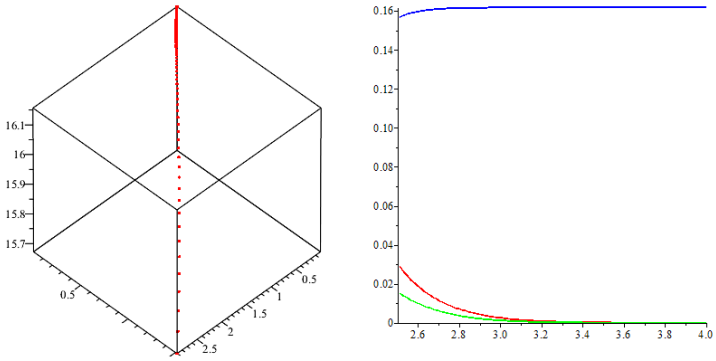


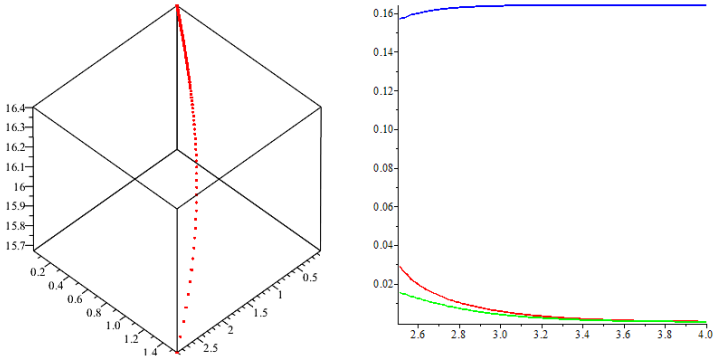
Figure 5 - Bifurcation of the function z[t].

```
 q1 := 1000;
 q2 := 1099;
for k from q1 to q2 do
c[k] := pointplot3d(a[k], axes=boxed);
ccx[k] := plot(px[k], color=red);
ccy[k] := plot(py[k], color=green);
ccz[k] := plot(pz[k], color=blue)
od:

 for i from 1000 to 1099 do
 q1 := i;
 q2 := i :
 display(seq(c[j], j=q1..q2), color=[red]);
 display(ccx[i], ccy[i], ccz[i]);

 od;
```

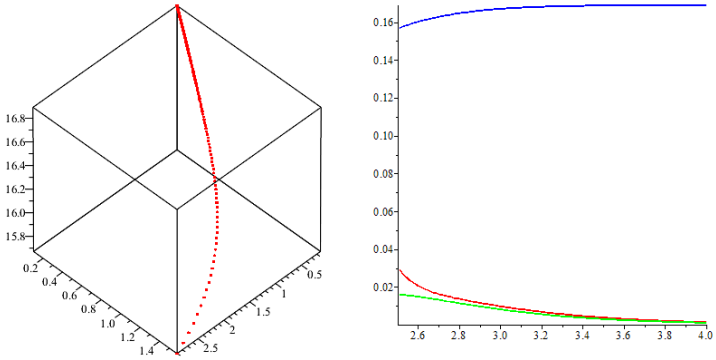
$s = 10$
$b = 0$
$r = 14$



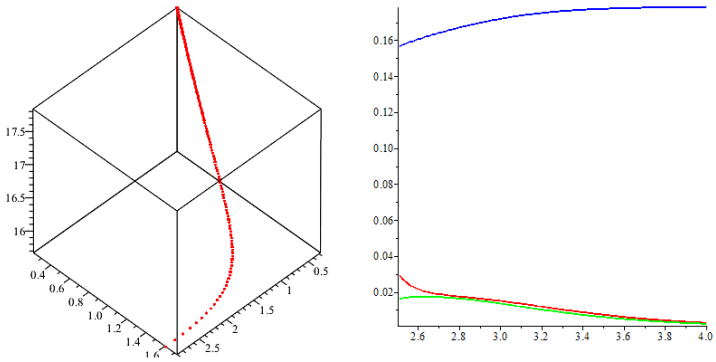
$s = 10$
$b = 0$
$r = 15$



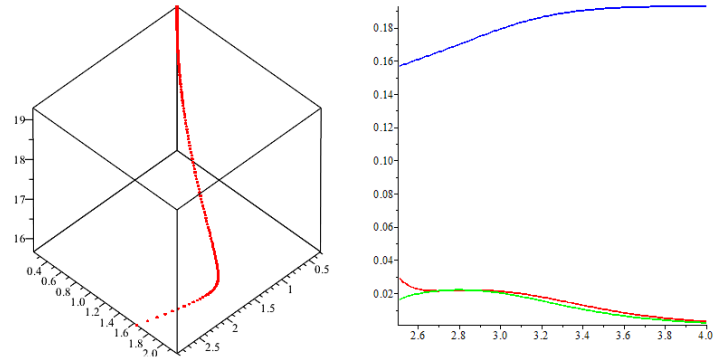
$s = 10$
$b = 0$
$r = 16$



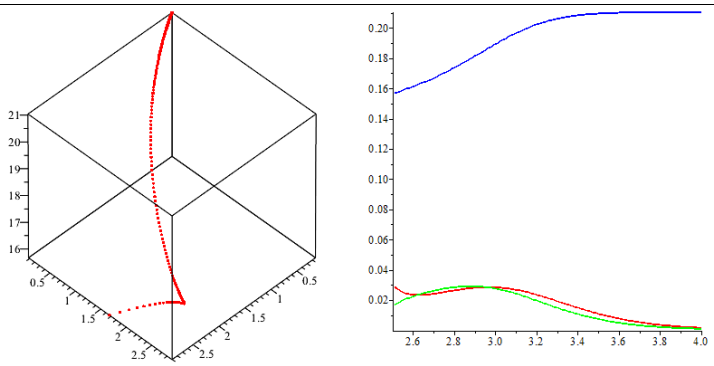
$s = 10$
$b = 0$
$r = 17$



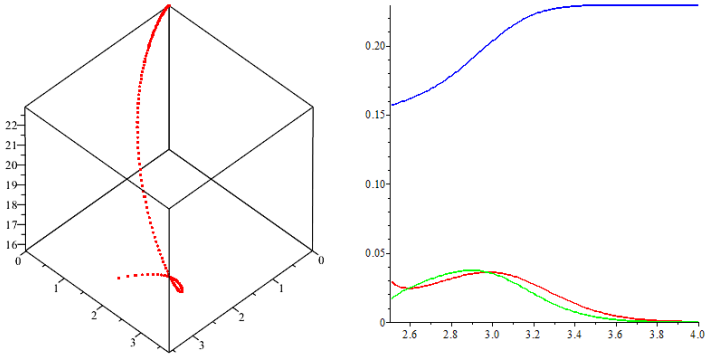
$s = 10$
$b = 0$
$r = 18$



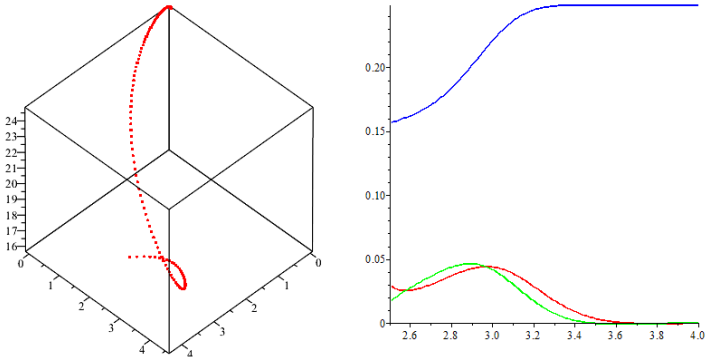
$s = 10$
$b = 0$
$r = 19$



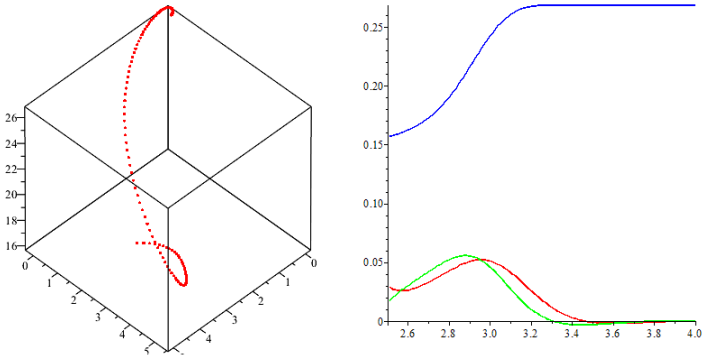
$s = 10$
$b = 0$
$r = 20$



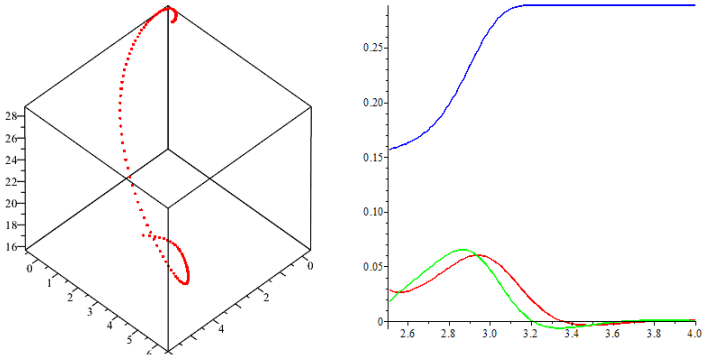
$s = 10$
$b = 0$
$r = 21$



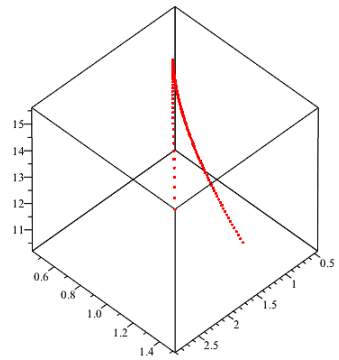
$s = 10$
$b = 0$
$r = 22$

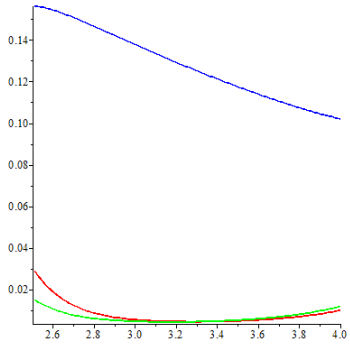


$s = 10$
$b = 0$
$r = 23$



$s = 10$
$b = \frac{1}{3}$
$r = 14$





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$b = \frac{1}{3}$
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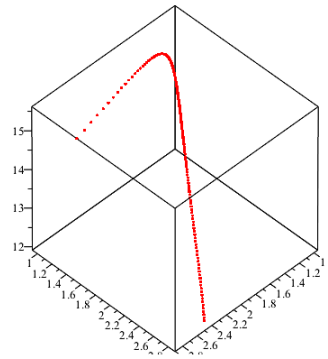

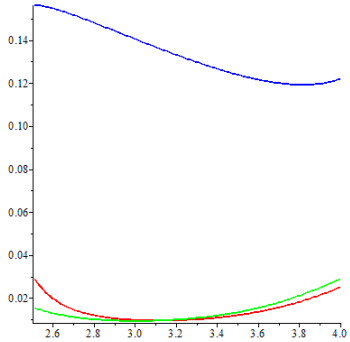

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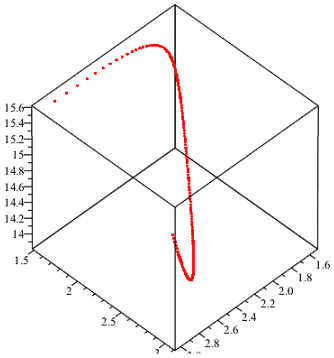

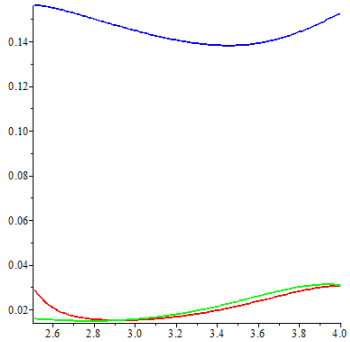

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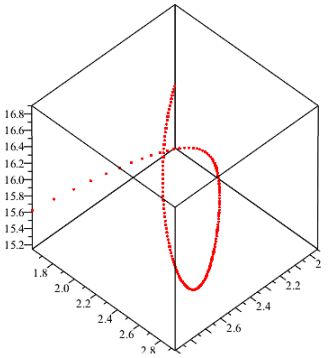
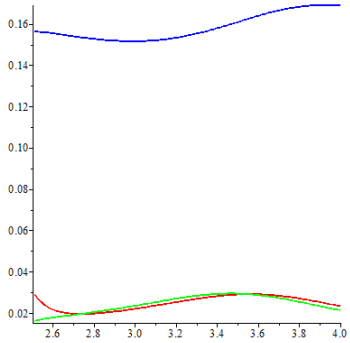
$b = \frac{1}{3}$
$r = 17$





$s = 10$
$b = \frac{1}{3}$
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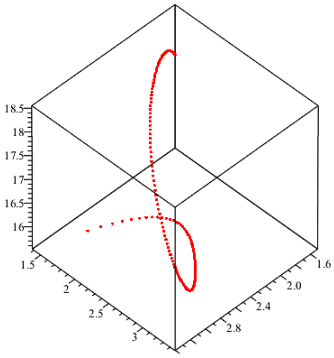
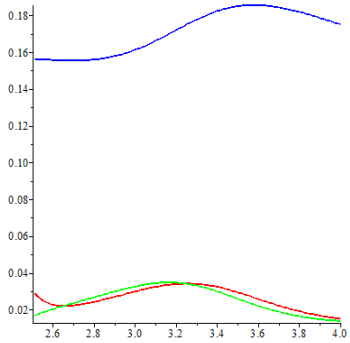
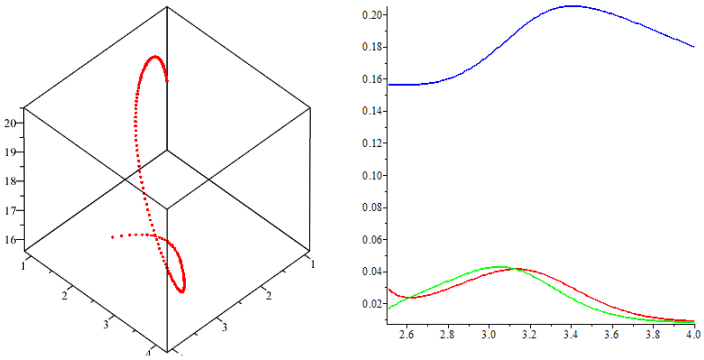
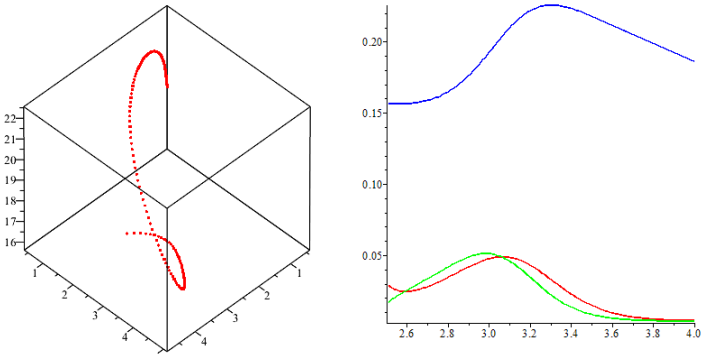




$s = 10$
$b = \frac{1}{3}$
$r = 19$



$s = 10$
$b = \frac{1}{3}$
$r = 20$



$s = 10$
$b = \frac{1}{3}$
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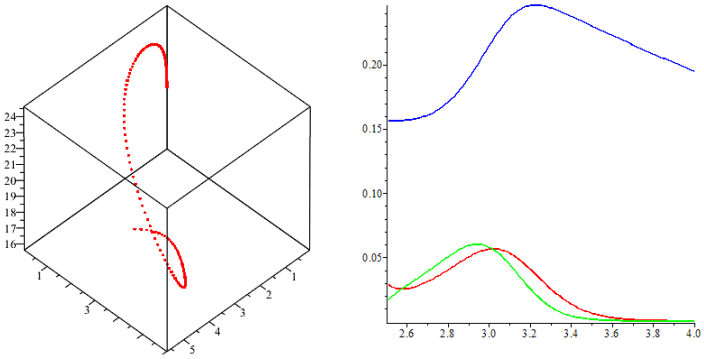

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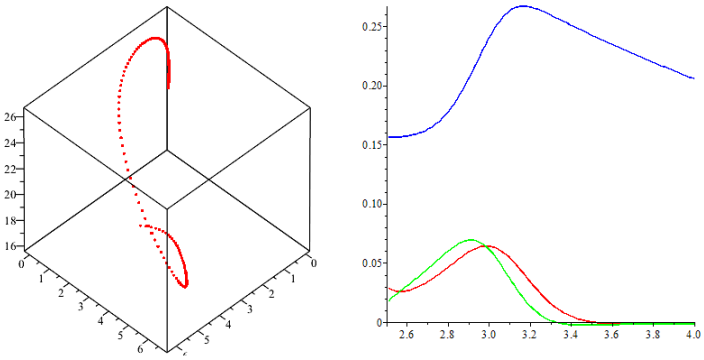
$b = \frac{1}{3}$
$r = 22$



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$b = \frac{1}{3}$
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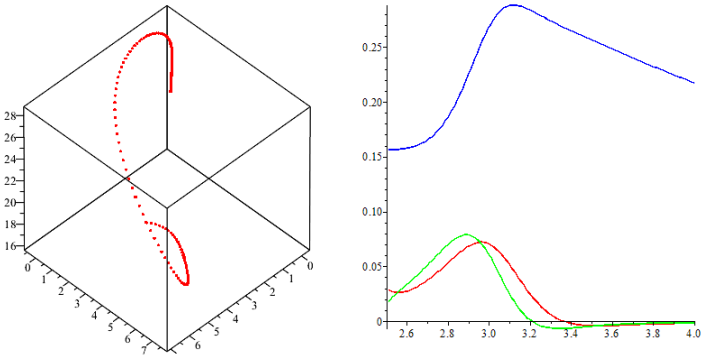

$s = 10$
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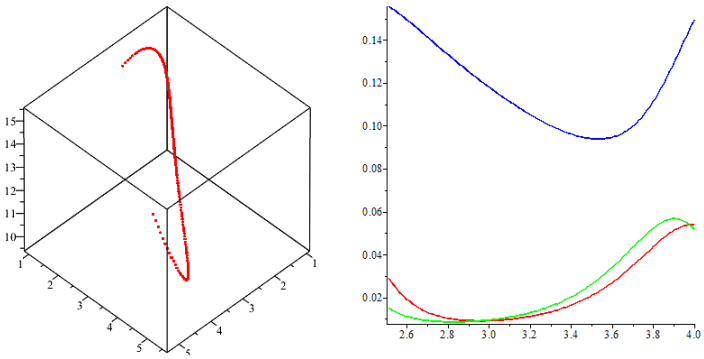

$s = 10$
$b = \frac{2}{3}$
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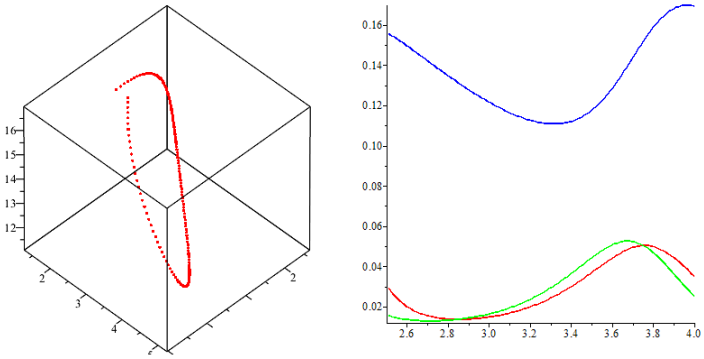

$s = 10$
$b = \frac{2}{3}$
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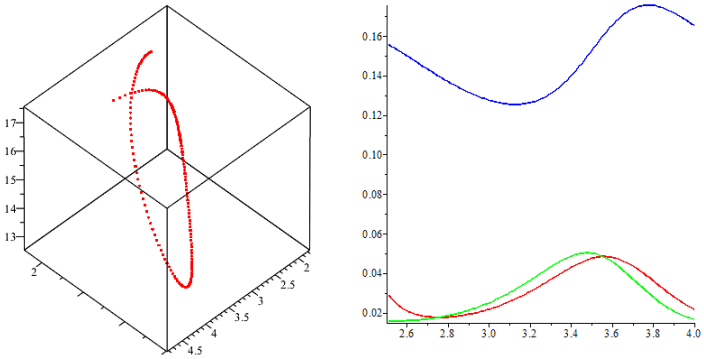
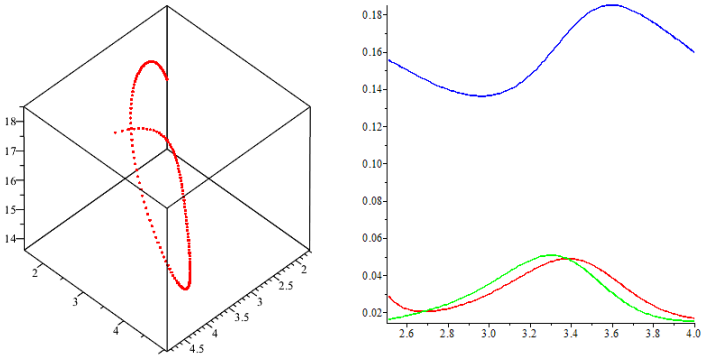
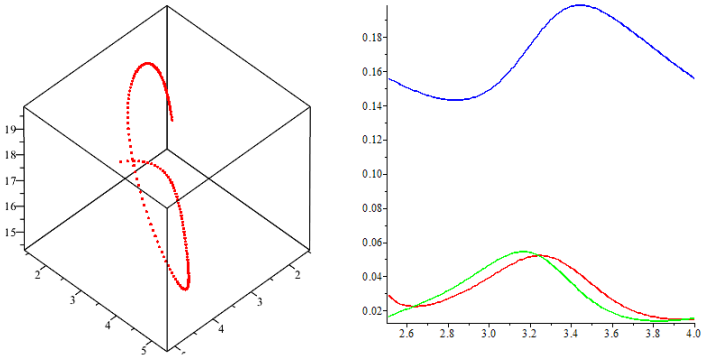


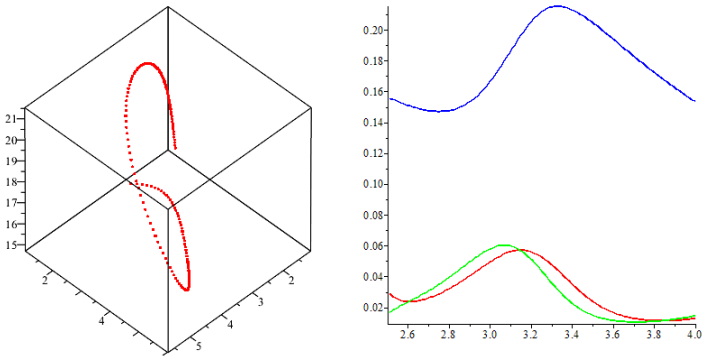
$s = 10$
$b = \frac{2}{3}$
$r = 17$



$s = 10$
$b = \frac{2}{3}$
$r = 18$



$s = 10$
$b = \frac{2}{3}$
$r = 19$



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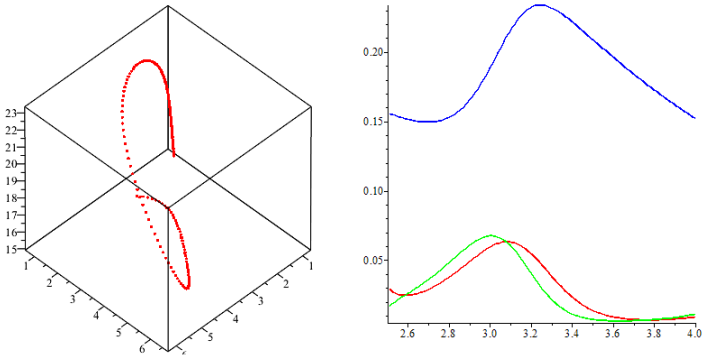

$s = 10$
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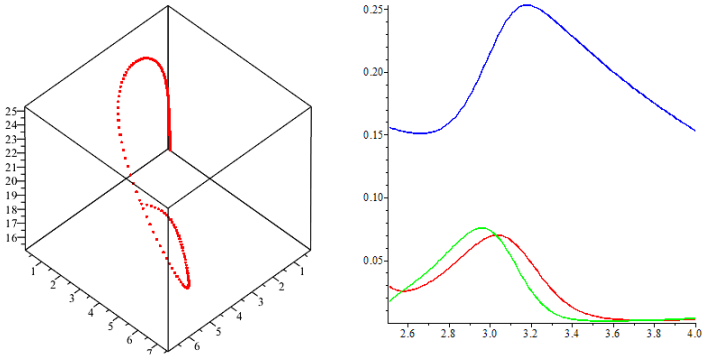

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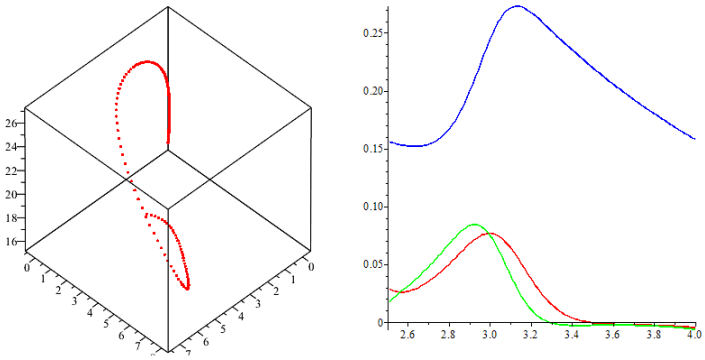

$s = 10$
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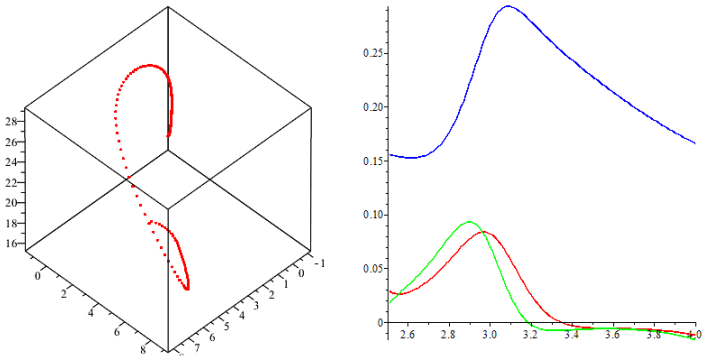
$r = 23$



$s = 10$
$b = 1$
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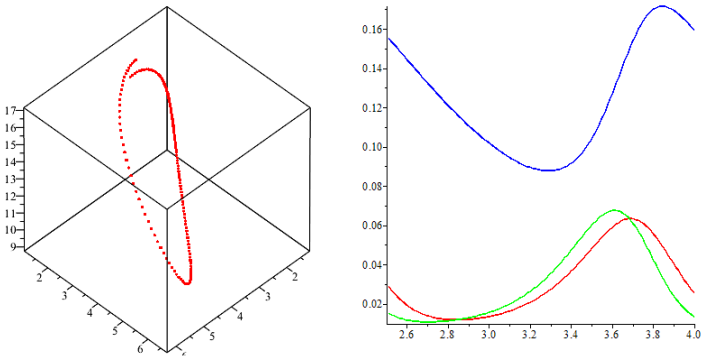

$s = 10$
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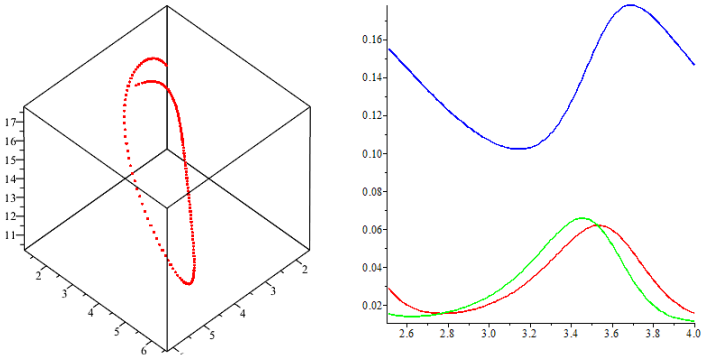
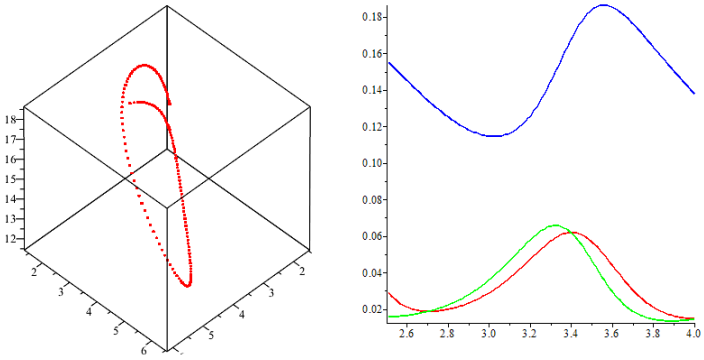


$s = 10$
$b = 1$
$r = 16$



$s = 10$
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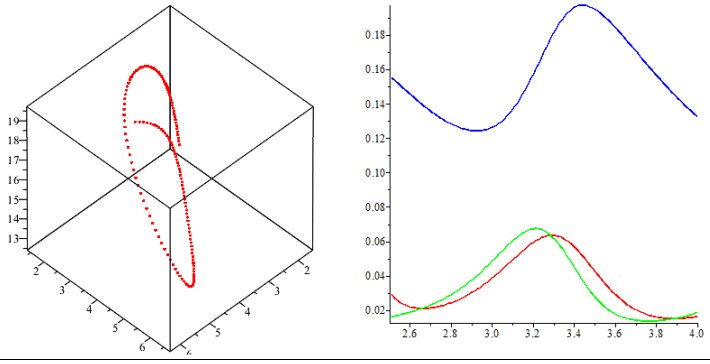
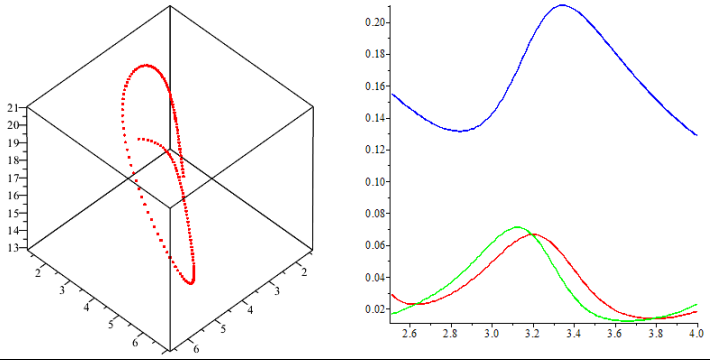
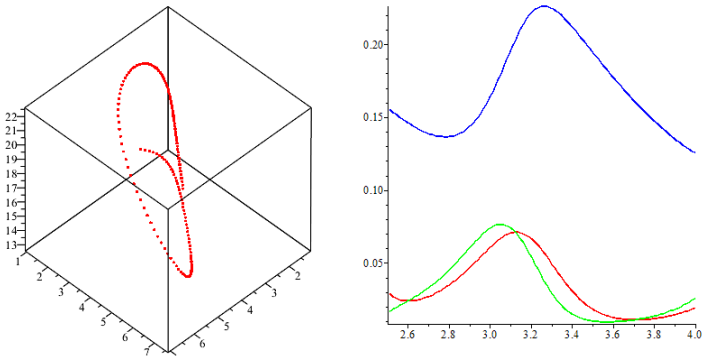


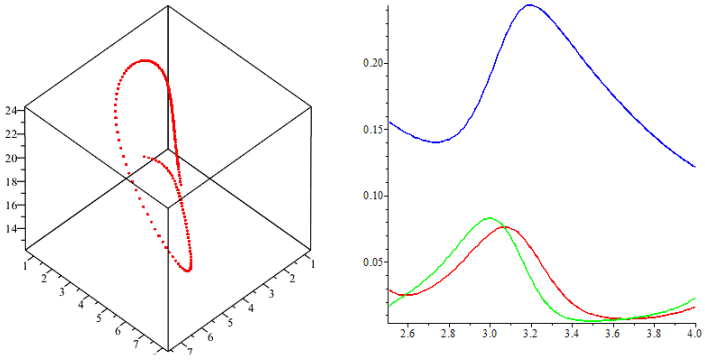
$s = 10$
$b = 1$
$r = 18$



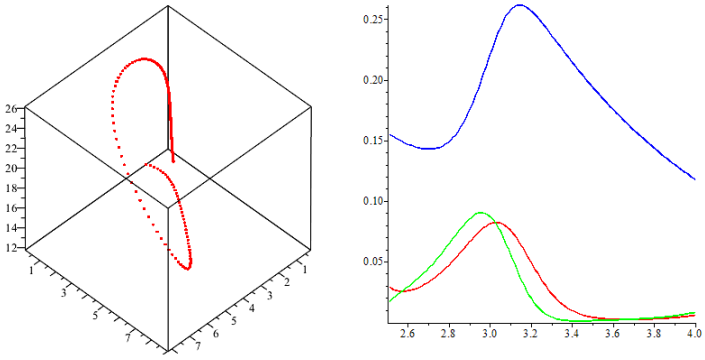
$s = 10$
$b = 1$
$r = 19$



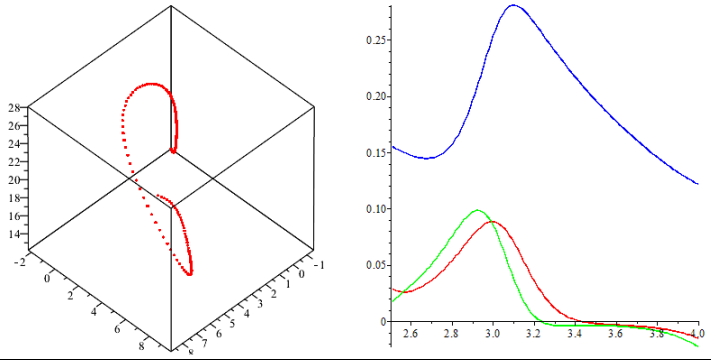
$s = 10$
$b = 1$
$r = 20$



$s = 10$
$b = 1$
$r = 21$



$s = 10$
$b = 1$
$r = 22$



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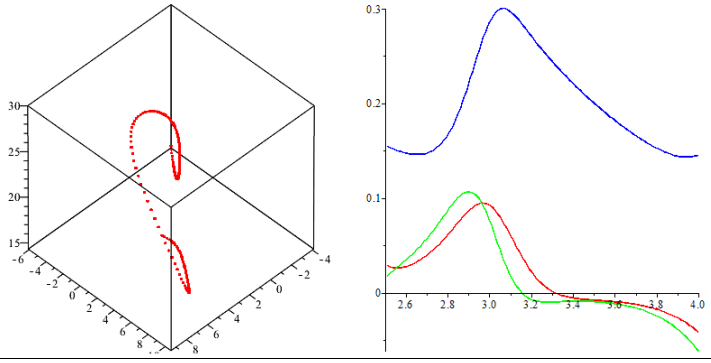

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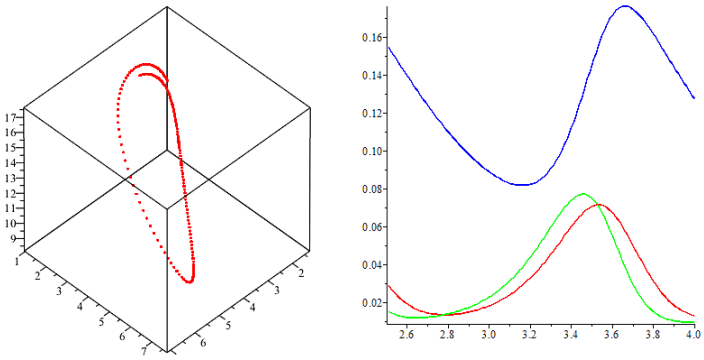

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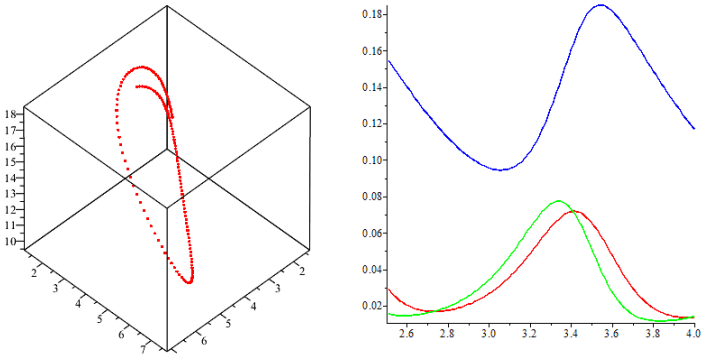

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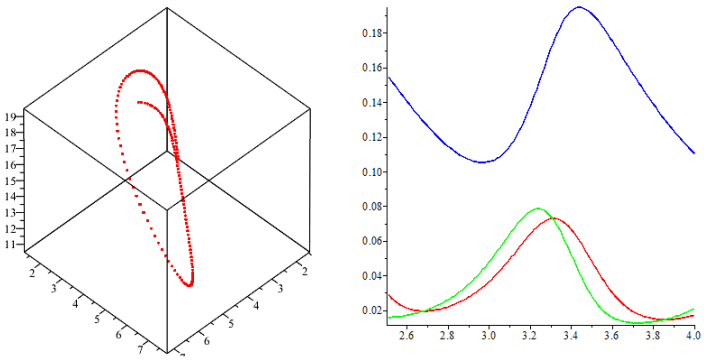

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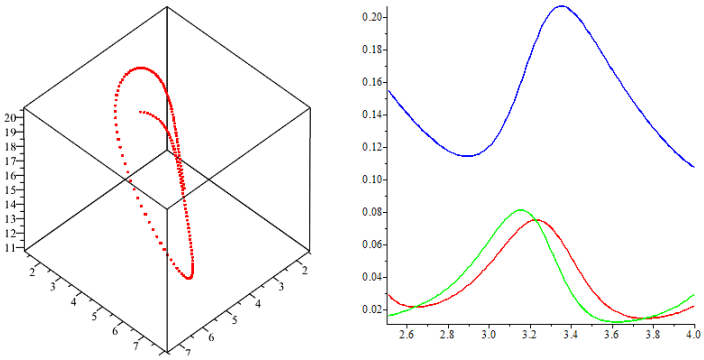

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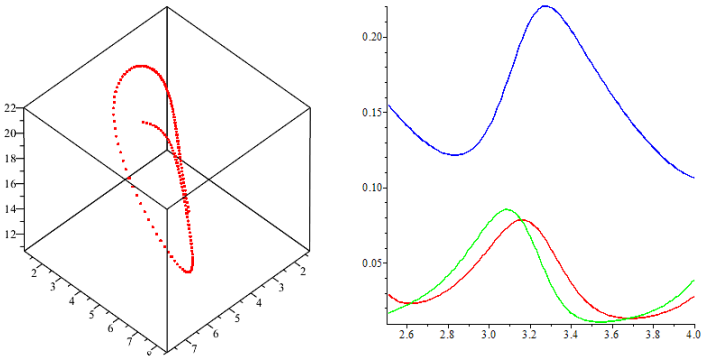

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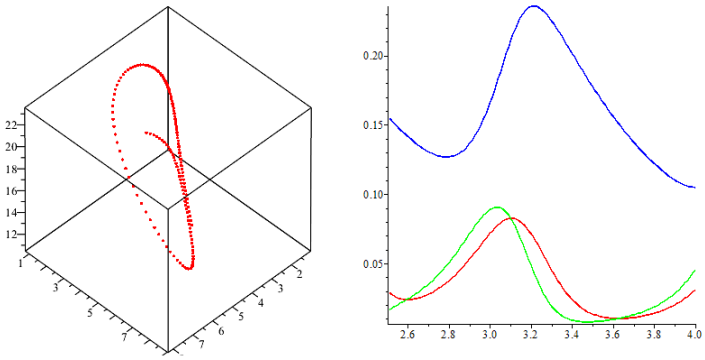

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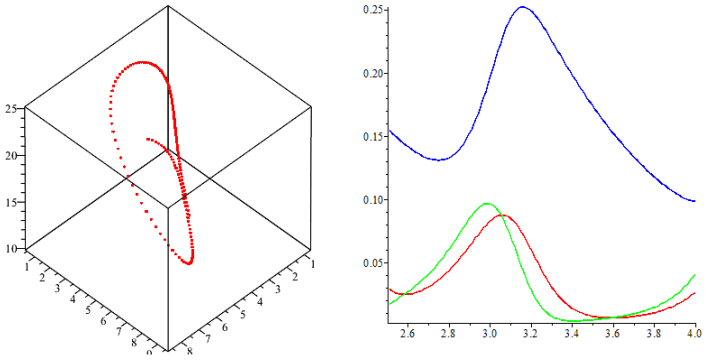

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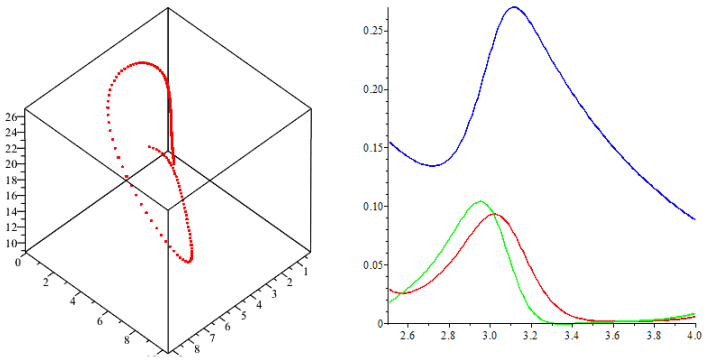

$s = 10$
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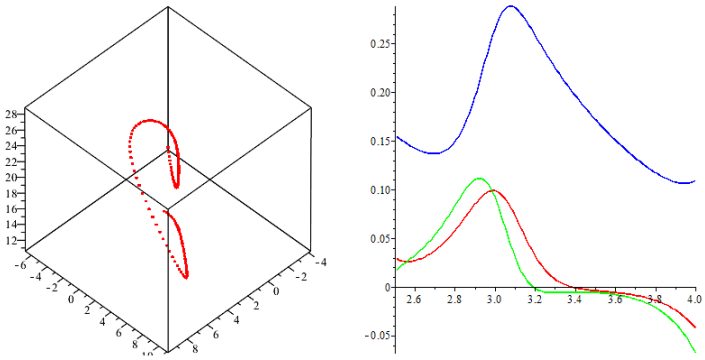

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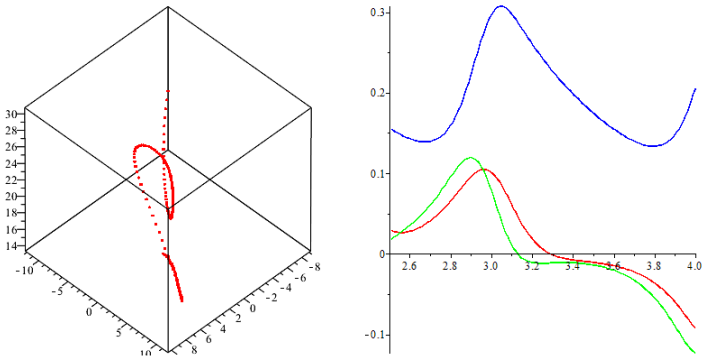

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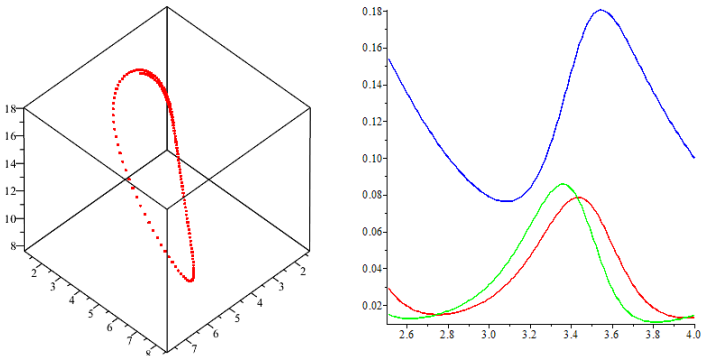

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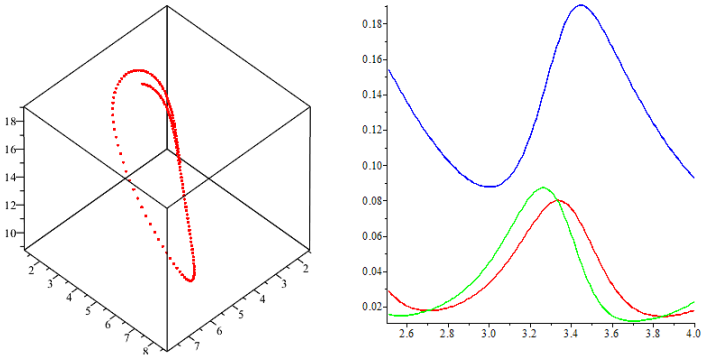

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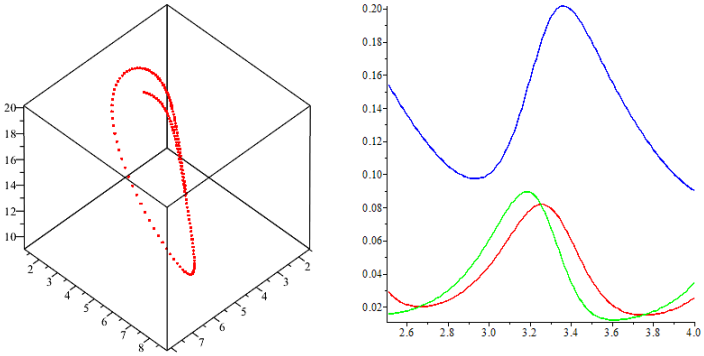

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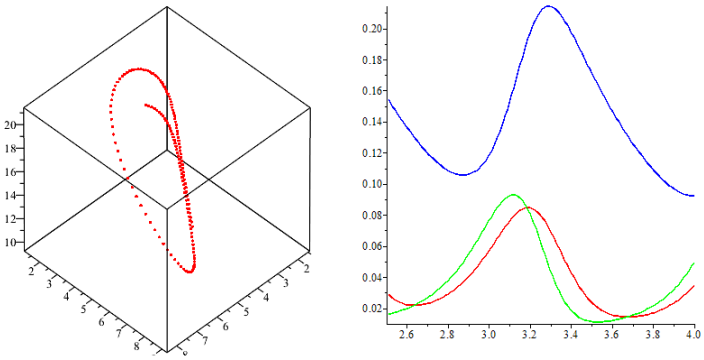

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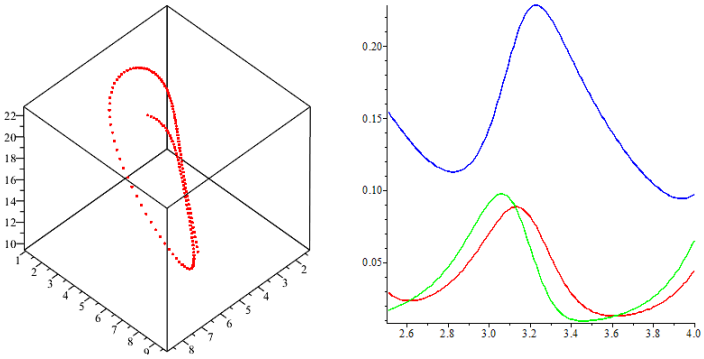

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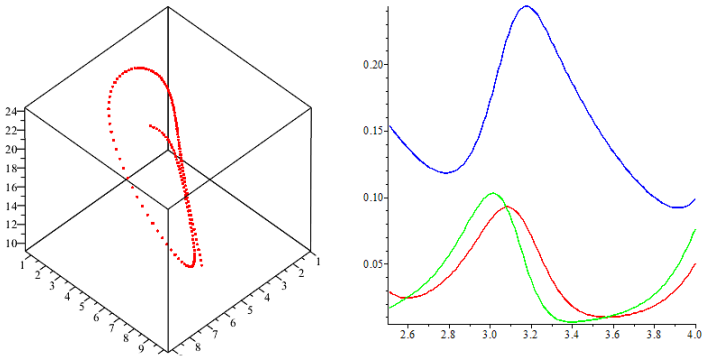

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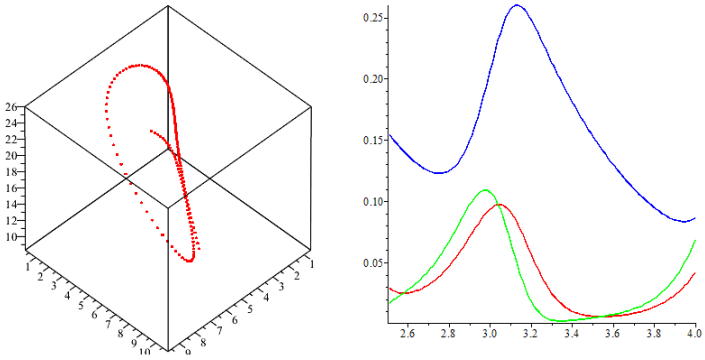

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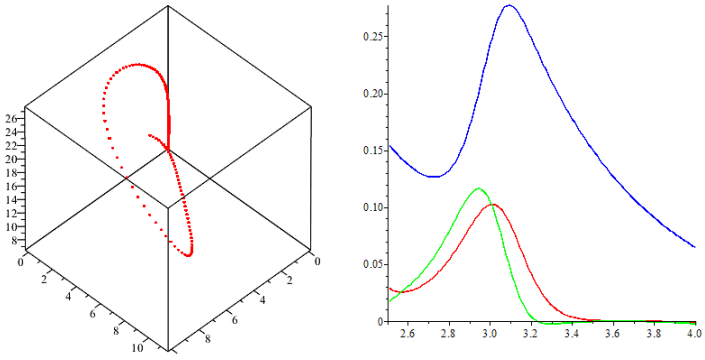

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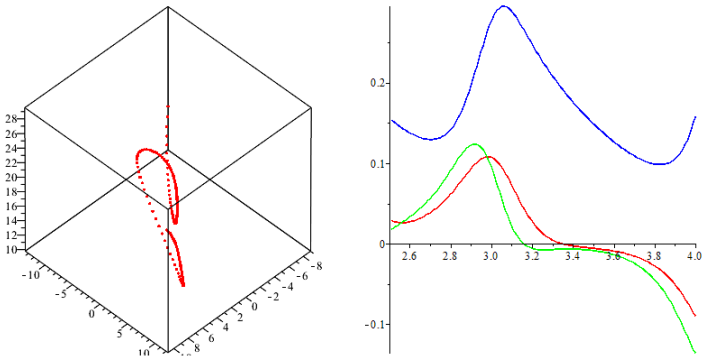
$b = \frac{5}{3}$
$r = 22$



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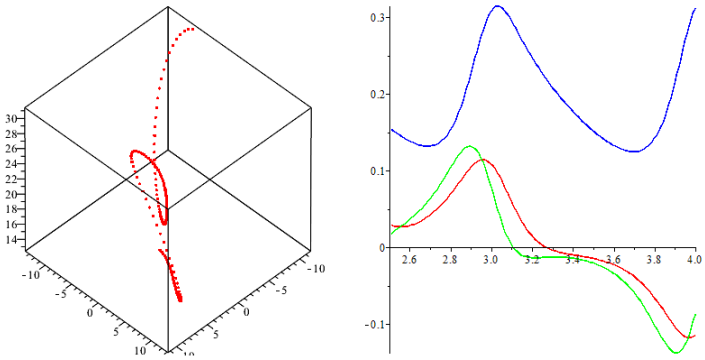
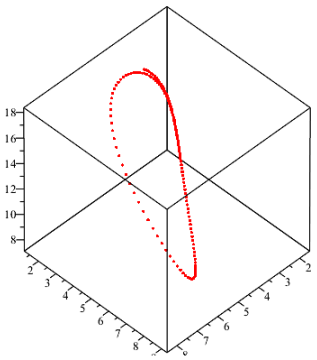
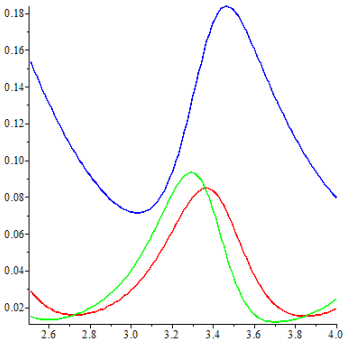
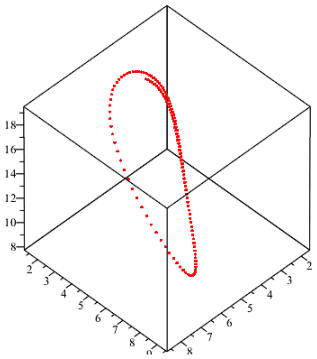
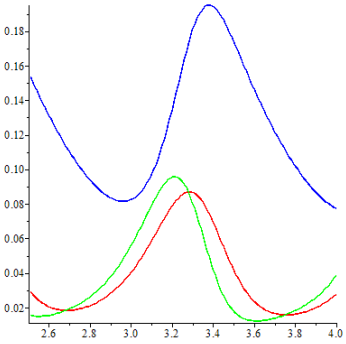
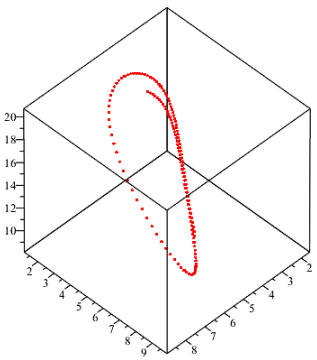
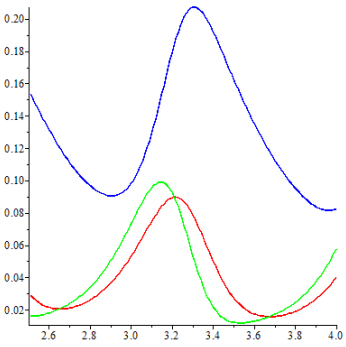
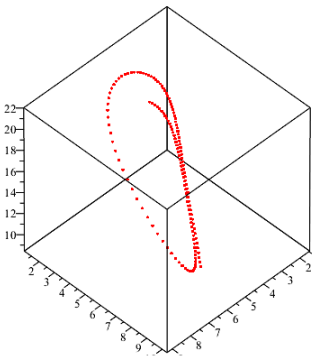
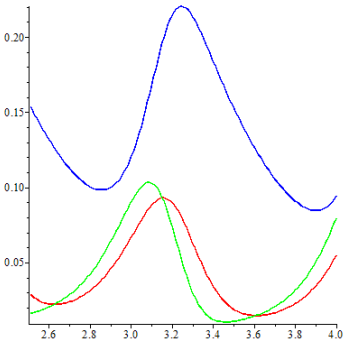
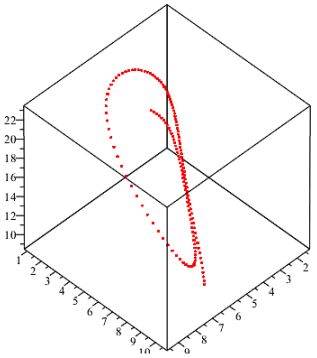
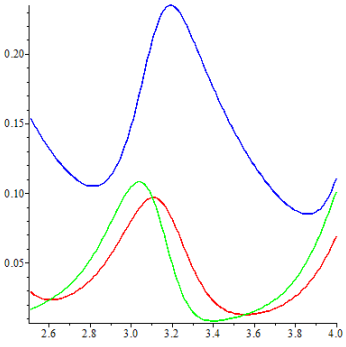
$b = \frac{5}{3}$
$r = 23$



$s = 10$ $b = 2$ $r = 14$		
$s = 10$ $b = 2$ $r = 15$		
$s = 10$ $b = 2$ $r = 16$		
$s = 10$ $b = 2$ $r = 17$		
$s = 10$ $b = 2$ $r = 18$		

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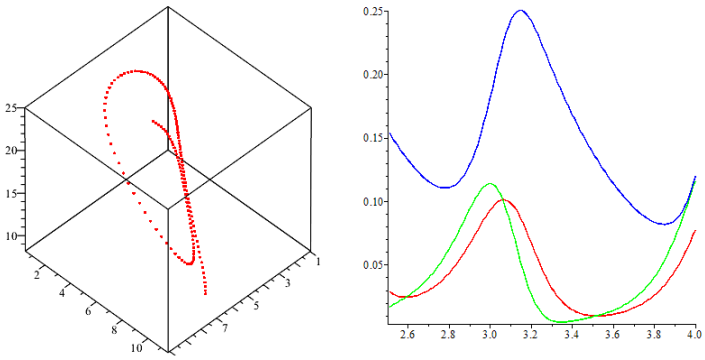

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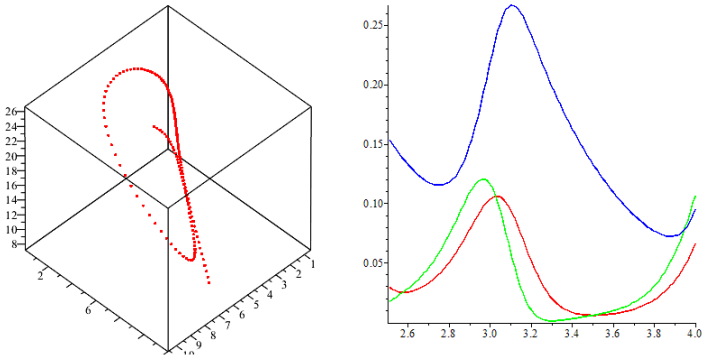

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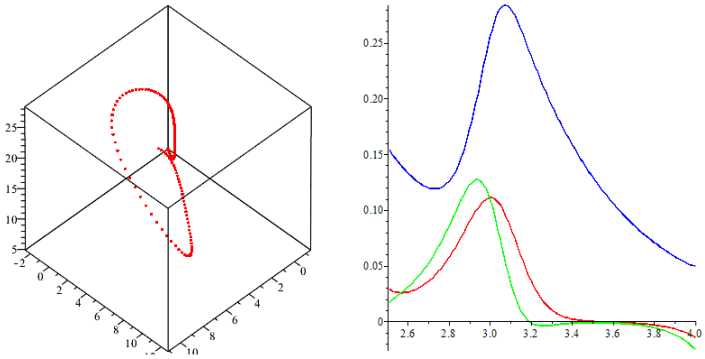

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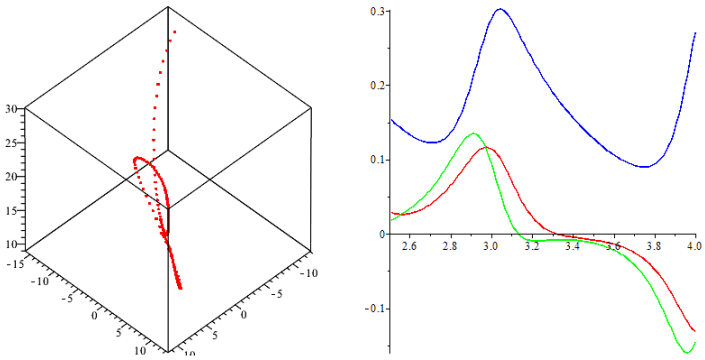

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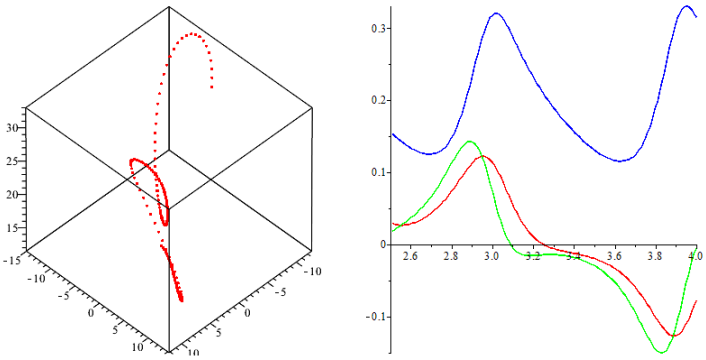

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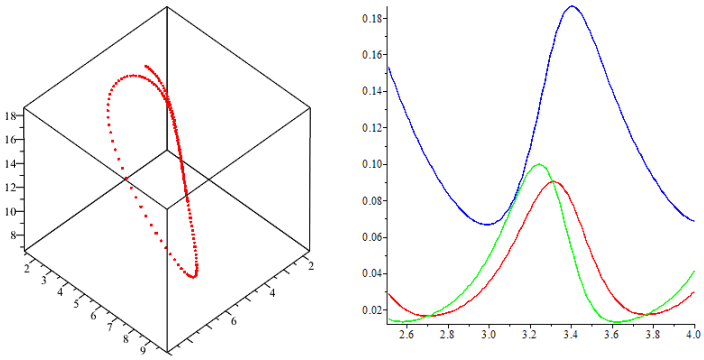

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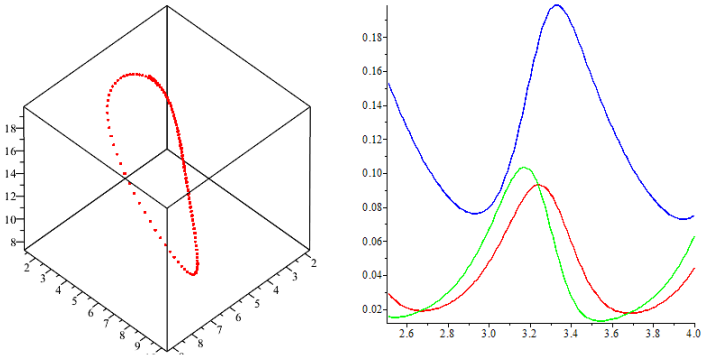

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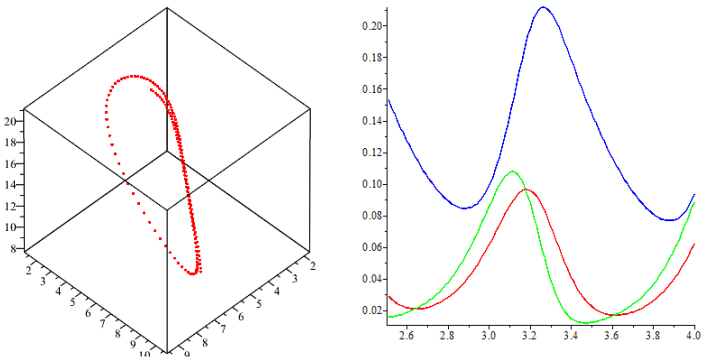

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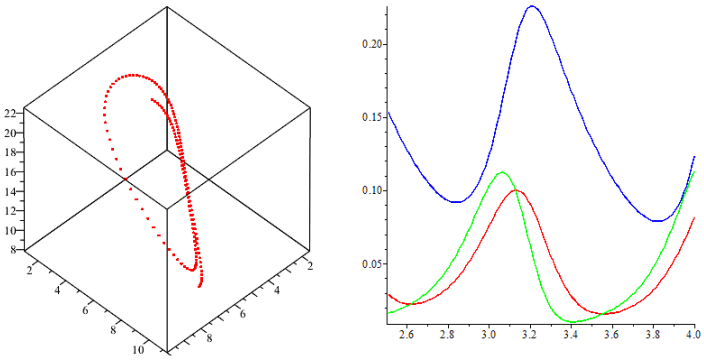

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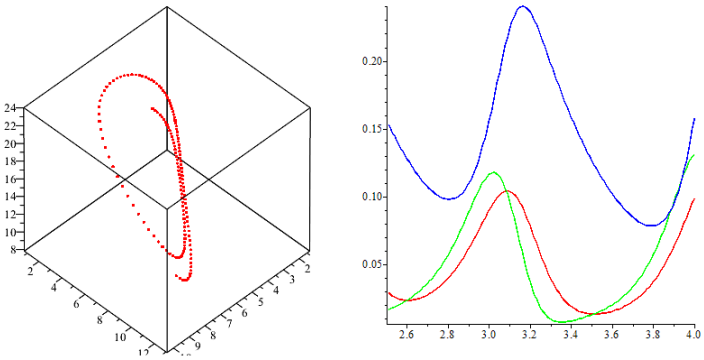

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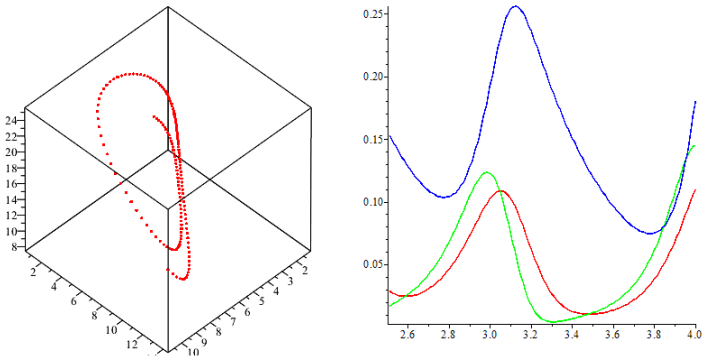

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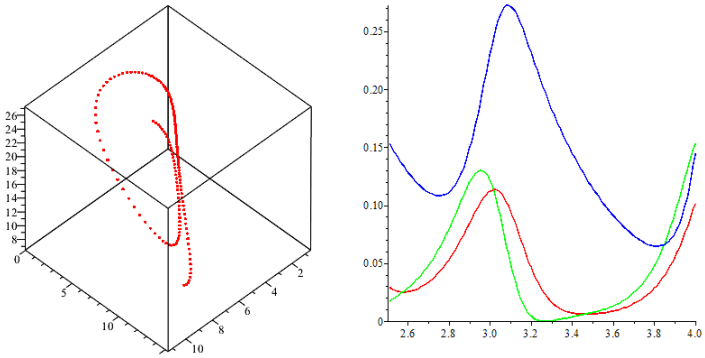

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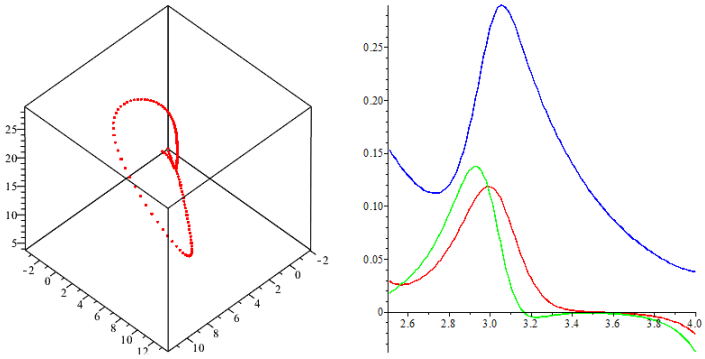

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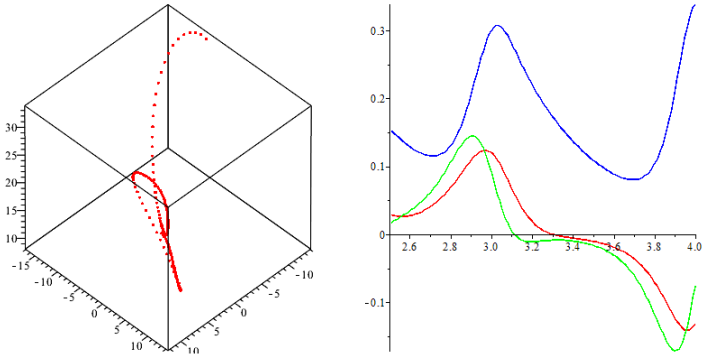

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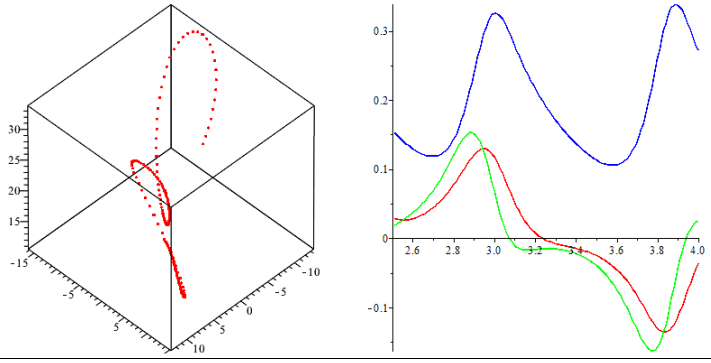

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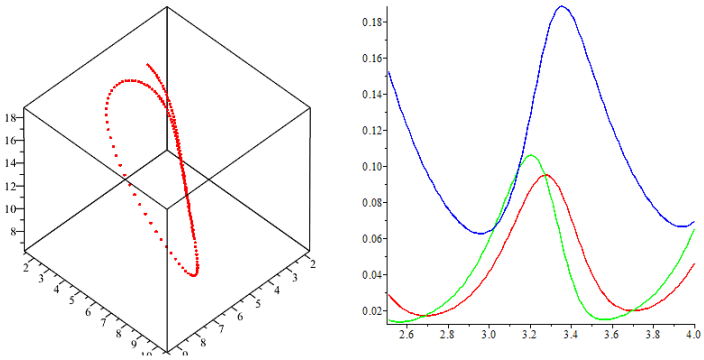

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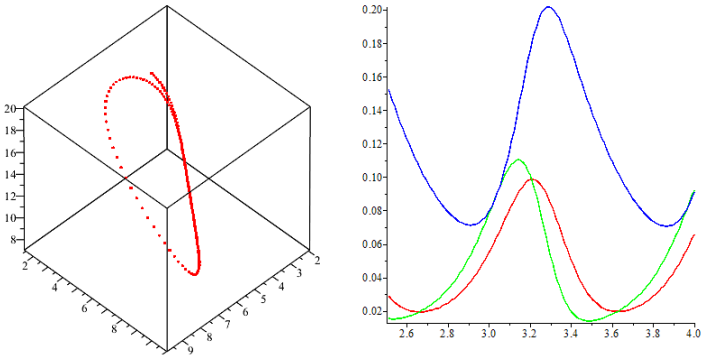

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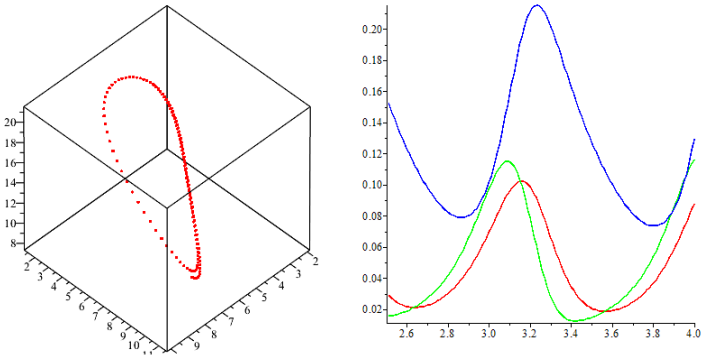

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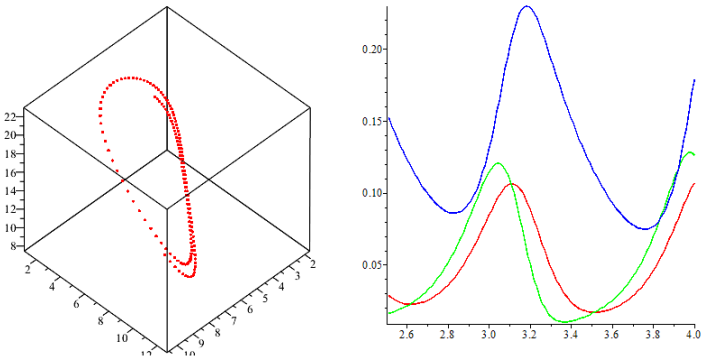

$s = 10$
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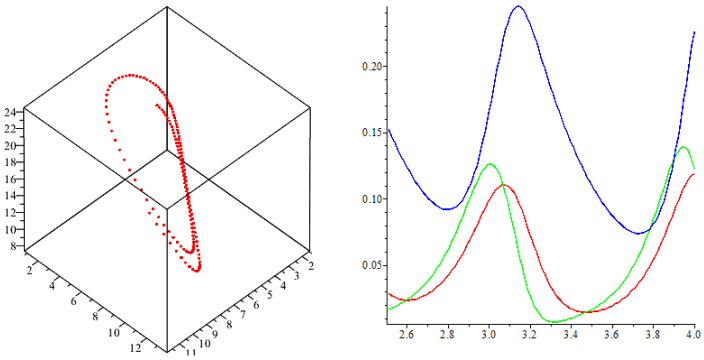
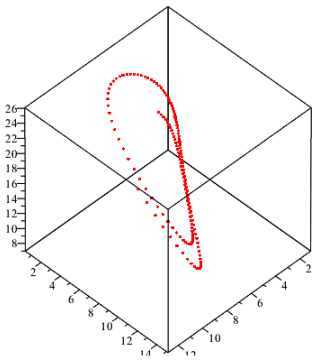
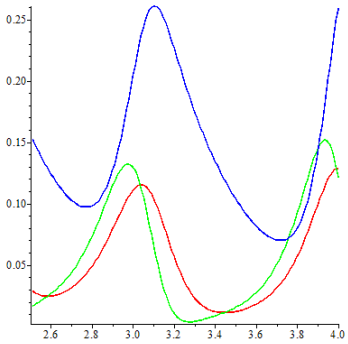
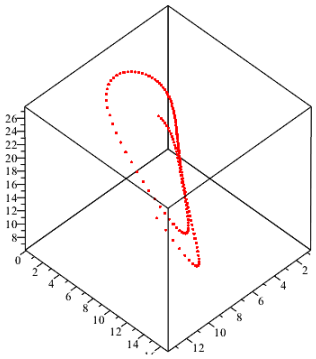
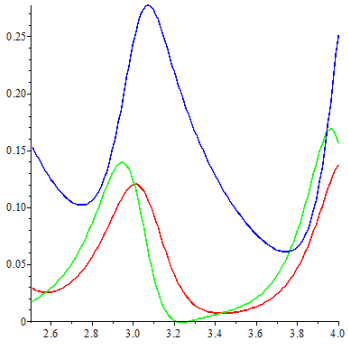
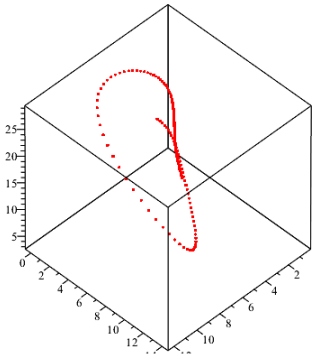
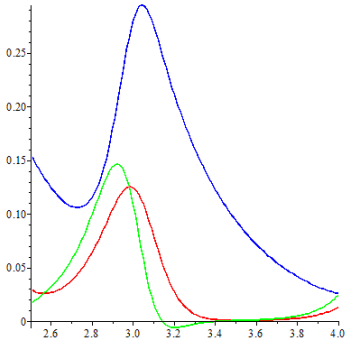
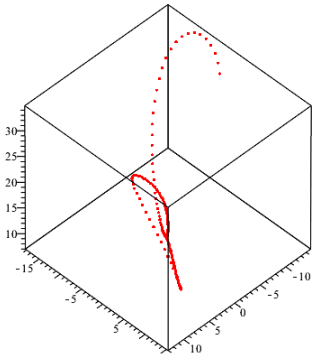
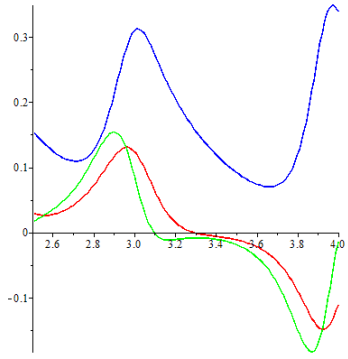
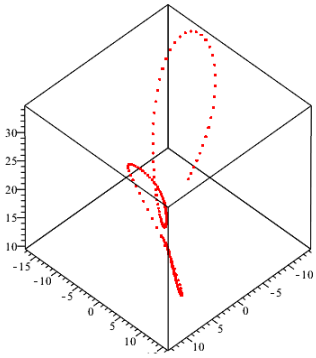
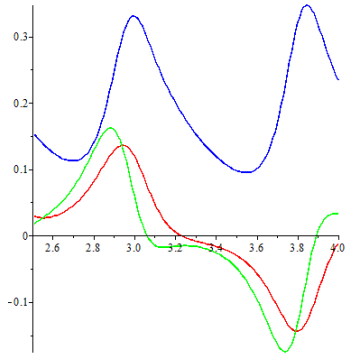
$r = 18$



$s = 10$ $b = \frac{8}{3}$ $r = 19$		
$s = 10$ $b = \frac{8}{3}$ $r = 20$		
$s = 10$ $b = \frac{8}{3}$ $r = 21$		
$s = 10$ $b = \frac{8}{3}$ $r = 22$		
$s = 10$ $b = \frac{8}{3}$ $r = 23$		

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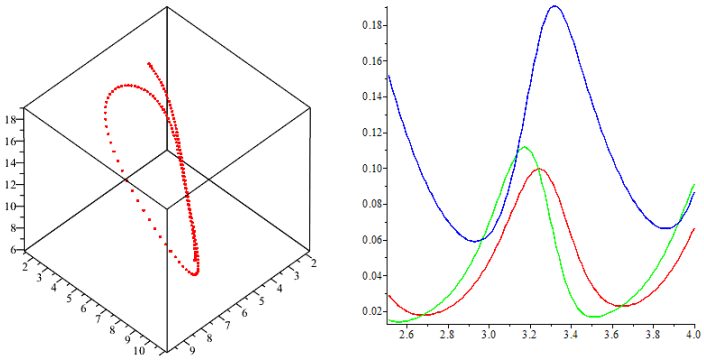

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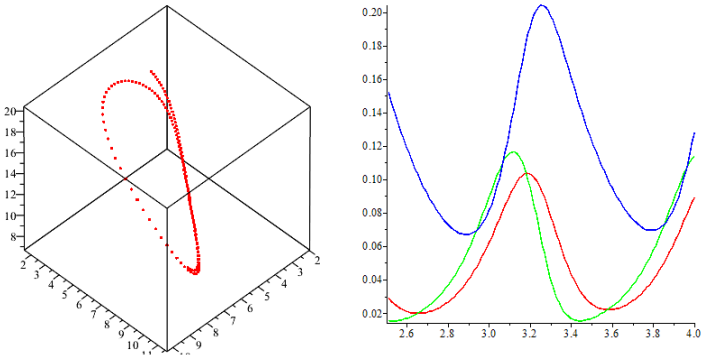

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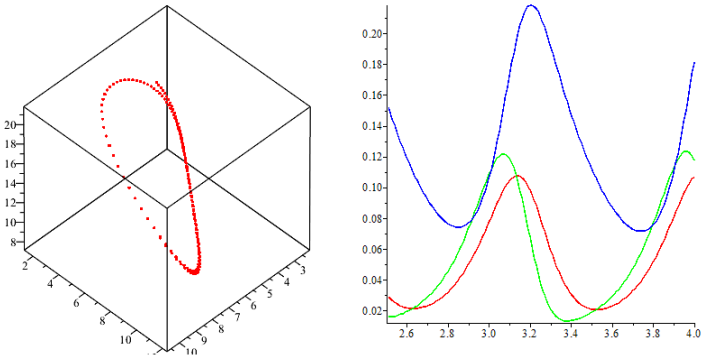

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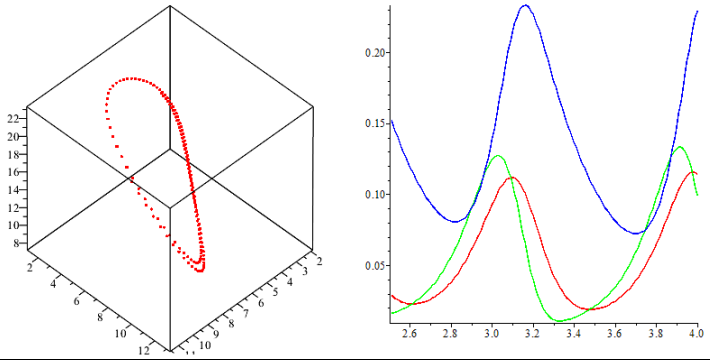

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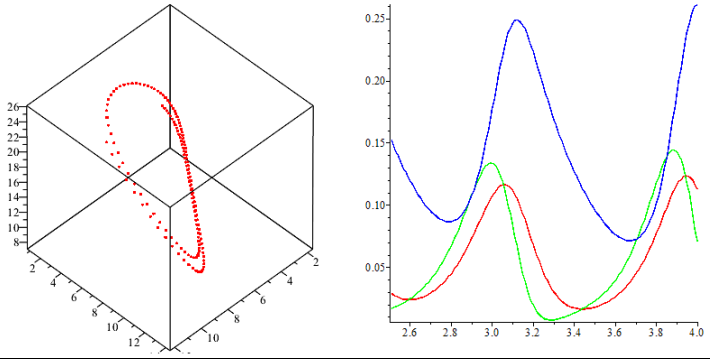

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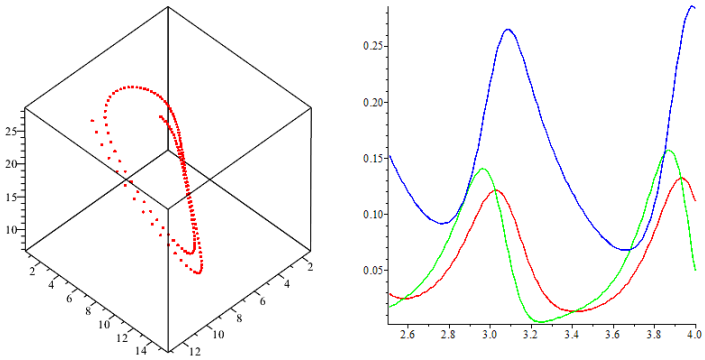

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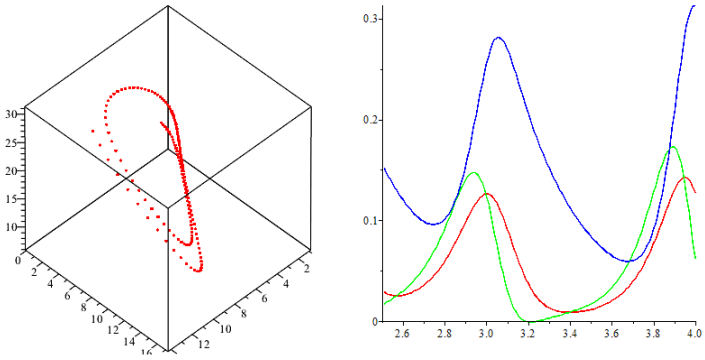

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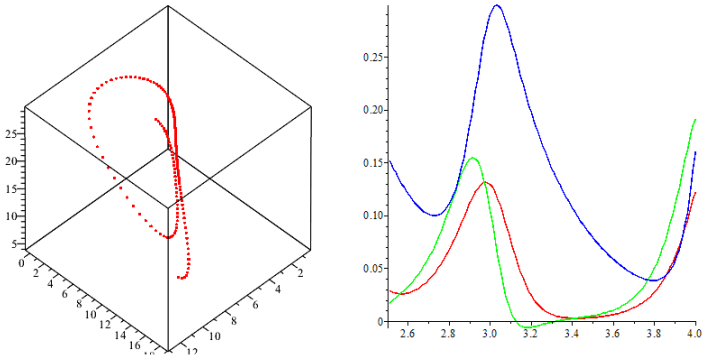

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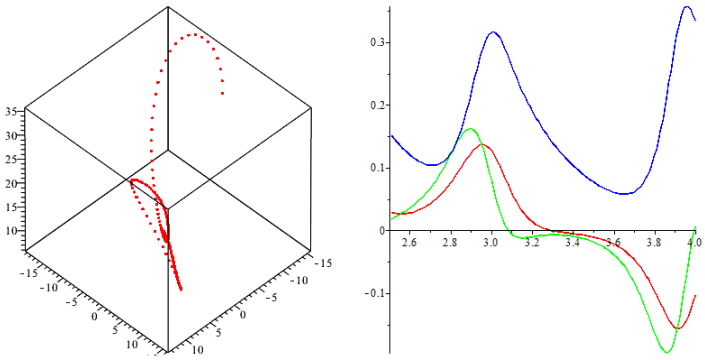

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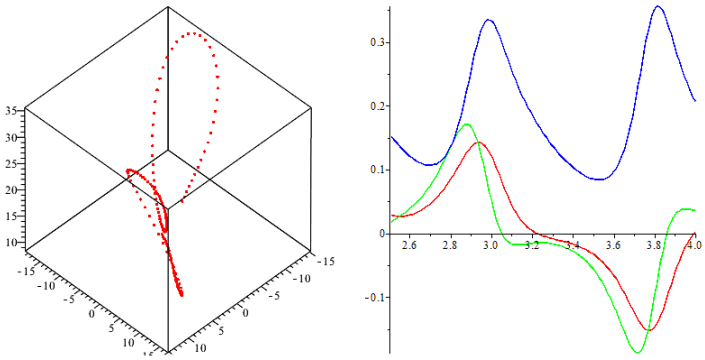

Results

The study of the bifurcation of the oscillation functions x,y,z for the Lorenz attractor for different values of the coefficients b, r.

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