

Theoretical principles of wave urbanistics

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Summary. During studying and mathematical description of the trends of urbanized territories development as ecological and town-planning systems there were several vague similarities founded between its major parameters change periodicity and other physical values, having undulatory nature. Obtained counterparts had predetermined interest for search of fundamental basics of urbanization. It turned out that all laws of Nature has the same basis – power permanence rule. This law is known in philosophy as principle of «change of unchangeable», in ecology – as a law of ecosystem self-regulation, in accordance to which at conditions of insufficient occupancy of the territory the population amount grows, and at conditions of over occupancy it decreases. According to research, noted is also attributable to dynamics of urbanized territories development, in which all four types of physical interactions are expressed to the certain degree. These and other results of research had allowed to articulate main principles of ecological space «urban physics» content of which have proven to be coordinated with postulates of new single field physics (Bishkek version).). Mentioned had allowed to lay down the theoretical foundation for occurrence of new branch in science of town-planning – wave urbanistics, as a science of management by undulatory processes of territories development in order to provide a conditions of their sustainable development.

Key words: urban planning, sustainable development, ecosystem self-regulation, ecological balance, demographical capacity, ecological and town-planning systems.

INTRODUCTION

World-wide issue of stable development is also instant for modern Ukraine, depopulation of which during a period from 1993 to 2006 was performed due to accelerated decrease of city dwellers number (Fig. 1) on the background of following expansion of the cities` territory.

Mentioned evidences about a fact that process of urbanization in Ukraine just as in developed countries of the world had passed from the stage of increasing to the stage of stagnation and for search of theoretical and methodological principles of regulation of stable development the arrangement of special researches become required.

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PURPOSE AND METHODS

The purpose of research is revealing of theoretical principles of urbanized territories stable development management. As a basic method the method of analogies was approved, which is used in human ecology since it allows do not

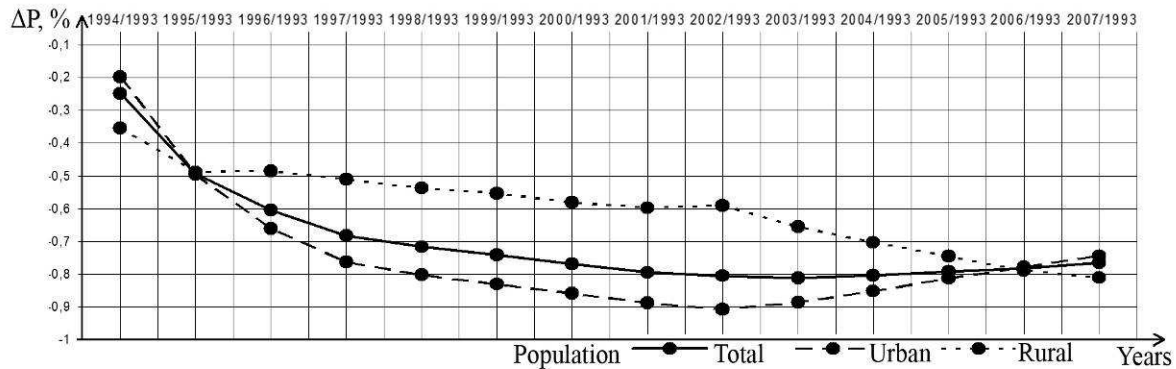


Fig. 1. Average annual rate of downsizing of Ukraine's population from 1993 to 2007

experiment with a system, part of which the human personally is, but to use knowledge about general regularities of development and to borrow images and models from more developed sub-disciplines such as physics or mathematics.

PHYSICAL PARALLELS

During studying and mathematical description of urbanized territories' development trends as ecological and town-planning systems (ETPS) there were some vague similarities discovered in periodicity of changes and main parameters (territory, population, dynamics of population, demographical capacity of the territory) and other physical values having adulatory nature. It was found that mechanical, electromagnetic and urban-ecological processes follow same quantitative theorem. It is discovered if to be interested not by oscillatory values but by how these oscillations take place [1]. Obtained analogies had enforced to search of other ecological and physical regularities of urbanized territories development [2, 3].

It was discovered that all laws of Nature has the same basis – power permanence rule (Lagrange, 1788; Maxwell, 1855), which determines fundamental principles of open systems stable development [4]. From this rule it follows that any change of produced power is compensated by corresponding change of lost power. This law is known in philosophy as principle of «change of unchangeable», in mathematics – as invariant, in physics – as tensor, in ecology – as law of ecosystem self-regulation [4, 5].

According to the law of self-regulation the purpose of ecosystem development is achievement of state of ecological balance. Ecosystem has certain capacity for every biological species. The reserve of this capacity which is insufficient occupancy of territory determines increase, and its exhaustion which is over occupancy of territory causes to reduction of density of specie (Fig.2) [5]. According to results of our research mentioned is also attributable for dynamics of ETPS development, in which were discovered certain expressions of all four types of fundamental physical interaction: strong, weak, gravitational and electromagnetic [1-3]. These and other results of research had allowed to form major principles of «urban physics» of ecological space content of which have been found as coordinated with postulates of new physics of single field (Bishkek version) [6, 7].

POSTULATES OF URBAN PHYSICS AND PHYSICS OF SINGLE FIELD

1. According to new physics built on model of rotating Universe, the basis of all physical interactions is a single field of force. Depending on level of supervision this field appears against researchers now in the form of gravitational now in form of electromagnetic now in form of nuclear fields [6, 7]. As was mentioned before, the similar thing was discovered by our research, in which urbanization is considered as natural process of establishment and development of the population-environment system in multi-level ecological space [1-3, 8].

2. In physics of single field the particular role is played by idea of absolute, which brings the single universal and simple to the foreground, whereby for all levels and all systems laws appear in the same way. And if

coordinates of territories` stable development is determined by the law of ecosystem self-regulation. Basically, methodology of assessment and regulation of territories stable development offered by us is shifted around this law

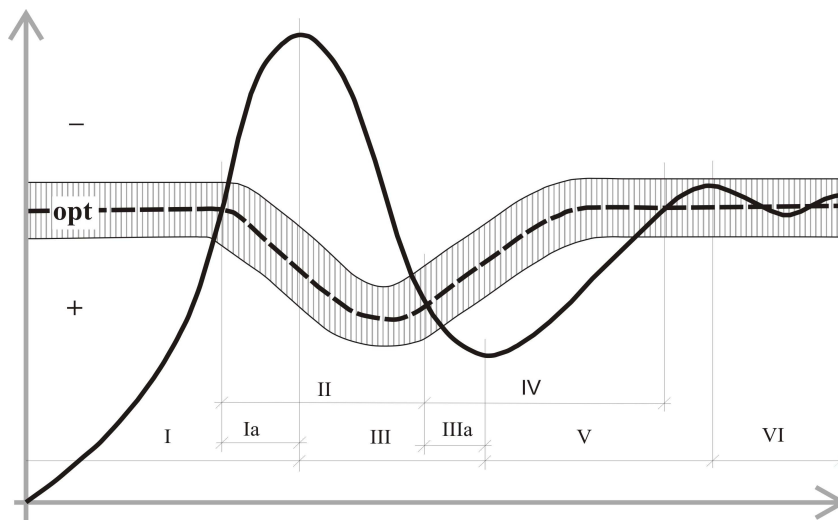


Fig. 2. The self-regulation ecosystem by V. Dolnyk:

I-VI – stages of ecosystem population capacity of the environment range of equilibrium.

— — population

- - - - capacity of the environment

||||||| – range of equilibrium

± opt – quality of environment

physics of Einstein rests on thesis about relativity of all systems of coordinates and absoluteness (regularity) of speed of light, then new physics rests on thesis about absoluteness of all systems of coordinates and relativity (with variable values) of speed of light. Thesis about relativity of systems of coordinates also lays in the basis of estimation models of environment state and territories development, which usually built on comparison of modern state of town-planning object with previous period of its development or with average factors by country, region or world [9-13].

3. By absoluteness of systems of coordinates in new physics is meant, as minimum, center around of which the Universe is rotating, «age» of which is determined by period of its full rotation. According to our researches, absoluteness of system of assessment

of planetary evolution. In this plane, the center of offered assessment system of coordinates the targeting stage of ecosystem development becomes – the state of its ecological balance (see Fig.2, stage VI) functional dimension of which the equality of $\pm 10\%$ range of deviation of region population demographic capacity and amount parameters is [9]. Quantitative expression of parameters of balance range – one-of-a-kind «bifurcation point area» of ETPS following development ways allows to describe its qualitative condition, forecast development, determine correspondent to «ecological age» (stage of its development) strategy of the following development of regional town-planning object. Space center, around of which the region is «collected» and “urbanization universe” is spin is a city (Fig.3-5) [14-16].

4. By correspondence of speed of light in new physics of universe that is rotating is meant insignificant difference in speed of light determined by direction if its flight – «along» or «against» of direction of universe`s rotation. In some extent, similar is also fare for expression of law of ecosystem self-regulation under which the speed and direction of dynamics of population (increase – decrease) depends on what stage of cycle (wave) of development the changes occur. At beginning stage at conditions of reserve of ETPS rigidity certain level environment, the efforts of town-planning and ecological system co-directed to state of ecological balance, which is increasing of population (see Fig.2, stage I) and activation of eco-

nomical activity. In conditions of exhausting of capacity their efforts against are directed for: town-planning – for following expansion of areal borders and going of ETPS for a new level of its aerial integrity with new ecological potential and balanced condition; ecological – for restoration of previous balanced condition, which become decrease of population and fading of economic activity (see Fig.2, stage III). Specified anti-directedness of efforts at final (targeting) stage of certain cycle of development leads to occurrence of constant oscillations in the range of ecological balance (see Fig.2, stage VI). By direction of optimum arrow these oscillations occur (if does not intrude into additional circumstances)

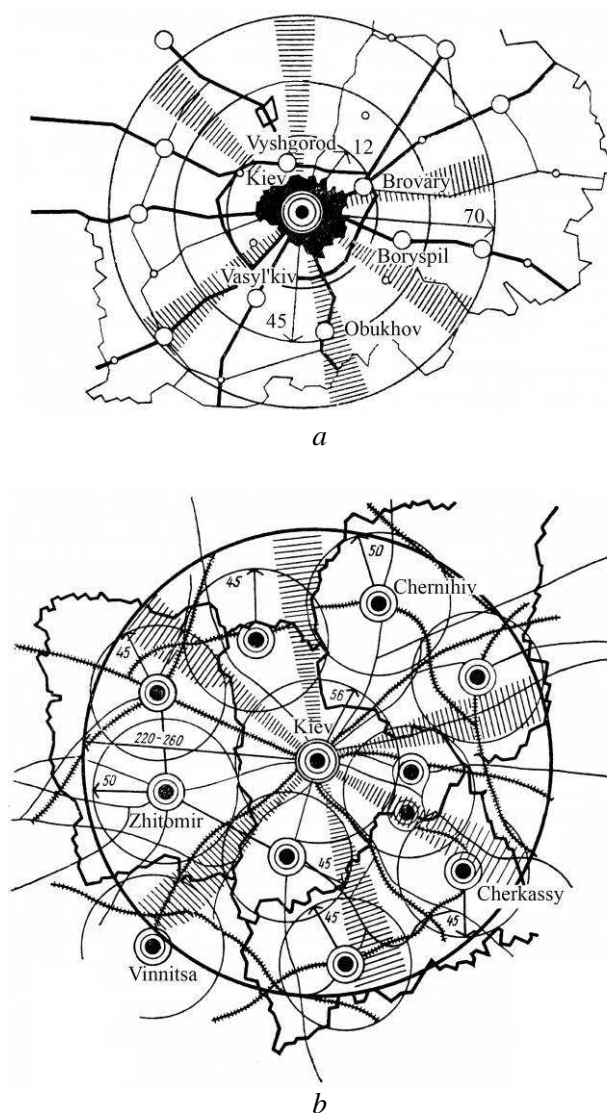


Fig. 3. Space-donut development of Kyiv city agglomeration (a) and Kyiv capital region (b) by M. Dyomin

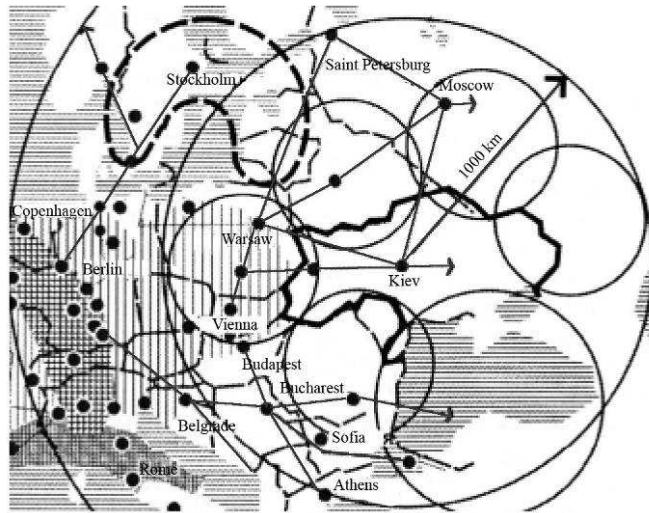


Fig. 4. Ukraine in structure of European space by Y. Bilokon

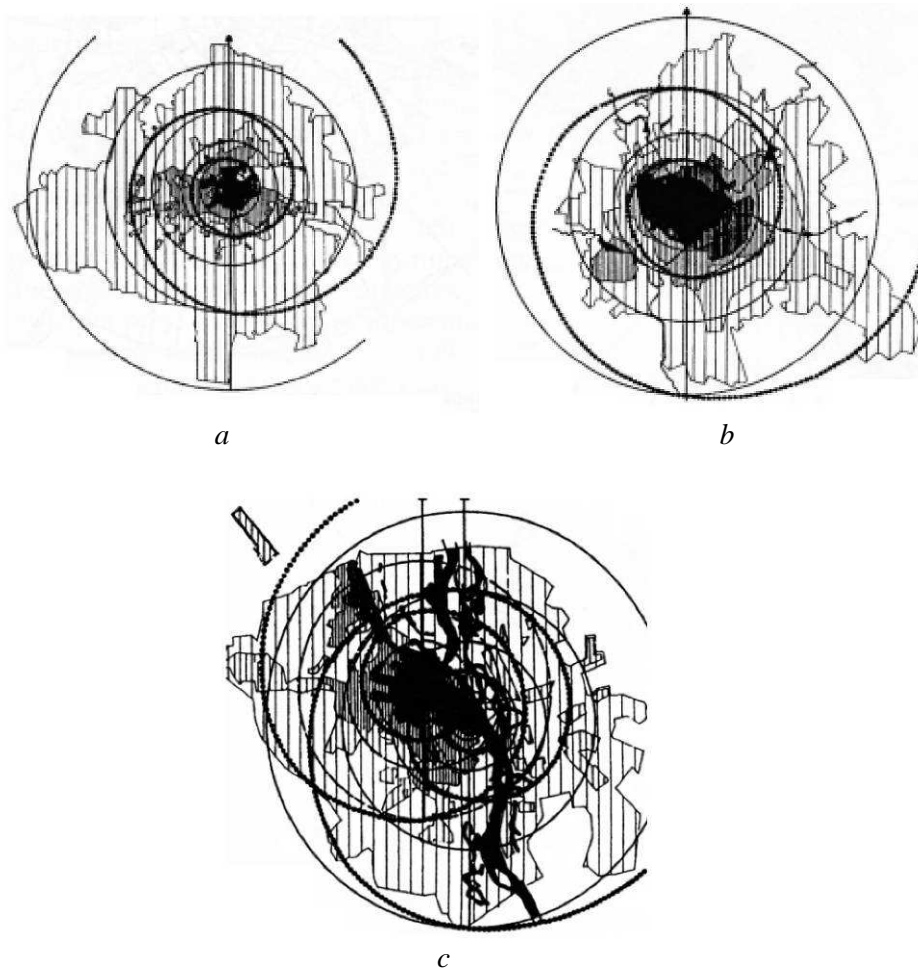


Fig. 5. Space-helical development of Lvov (a), Kharkov (b), Kyiv (c) by N. Shebek

in the same side – the side of less action, to the place where the state of system is mostly profitable, optimum and balanced energetically. Such state allows to system for efficiently spent of energy and demonstrate maximum activity given by nature.

5. In the physics of single field the term of levelness is introduced and (by direction of optimum arrow) the transfer from level to level is described. So the kinetic and magnetic energy of motion is the hierarchically higher form in comparison with potential and electrical rest energy. There is no such issue

in present physics. From here a number of systems of coordinates and reference points but only one level of supervision. Multi-levelness of development is also attributable to urban processes. This expressed by presence of concentric areas of influence of the central city in ecological space of region, country, or continent (see Fig.3, 4).

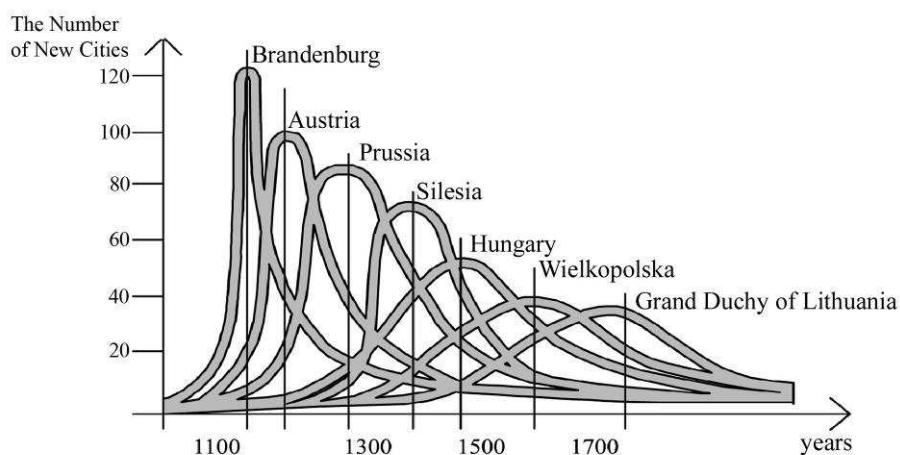
6. There is principally new mechanics in absolute physics which is mechanics of body motion «from the inside». This allows understand what is «filled» by body at change of qualitative conditions and absolute nature of multi-level motion. Here, instead of conventional «external» mechanics which obligatory provides supervision for the body from aside the division of supervisor and event is absent. In our case such mechanics of motion «from the inside» is basically development of ETPS, regularity of which is ensured by continuous change of stages and qualitative conditions in multi-level cycles of undulatory development of urbanized territories. Regarding division of supervisor and event. During research we always are inside the ecosystem which is changed by us, supervises and changes us since we are its integral part.

7. The magnetic field in new physics is a field of forces of momentum and vortex field, appearing at translational or rotational movement of body. As was determined in research, the population in space-time LT-system of physically measured values has scale of mass ($[L^3T^{-2}]$ – cube with angular acceleration [4]), which basically determines the force of momentum and gravity and in our case – «gravity-magnetic» field of ETPS (see Fig.3 – 5). The population density in LT-system will have

dimension o acceleration ($L^3T^{-2} / L^2 = [LT^{-2}]$) [13]. Nowadays approximately 70% of population of Ukraine and more than 50 % of World's population is concentrated in cities. In this aspect they are really become the centers of masses around of which the universe of civilization is «rotating». In the evolution of cities and urbanized regions the mentioned «rotating» discovers itself by translational-undulatory (Fig.6), concentric-donut (see Fig.3, 4) and translational-rotational (see Fig.5) accelerated process (curvilinear translation is always accelerated one) and pulsing-undulatory event of multi-level development of population-environment ETPS in ecological space city-region (Fig.7) [8, 18, 19].

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a



b

Fig. 6. Space-time displacement and «fading» of urbanization impulse in Europe by G.Petrishin (a) and by V.Samarkin (b)

So cities gradually compacting population and expanding borders and areas of influence of urbanized territories, from one hand, perform function of accelerator of development, but from the other hand, they act as brake of processes of increasing of population, since at conditions of over-compacting the decrease of birth rate occurs and, as consequence, the aging of population, increase of death rate and decrease of number [20].

9. The space is absolute in new physics. There is no and could not be endless straight lines in this space in closed rotational universe (inside the sphere) and all motion is acceler-

ated only. Similar also founded by our research in which stable development is not only linear process of constant number increase (attributable only for initial component of the wave, see Fig. 2, stage I), but oscillatory process of continuous change of accelerations and qualitative conditions. Straight and curve in physics of single field are combined into one and micro world is closed with macro world. Similar thing is also found in «urban

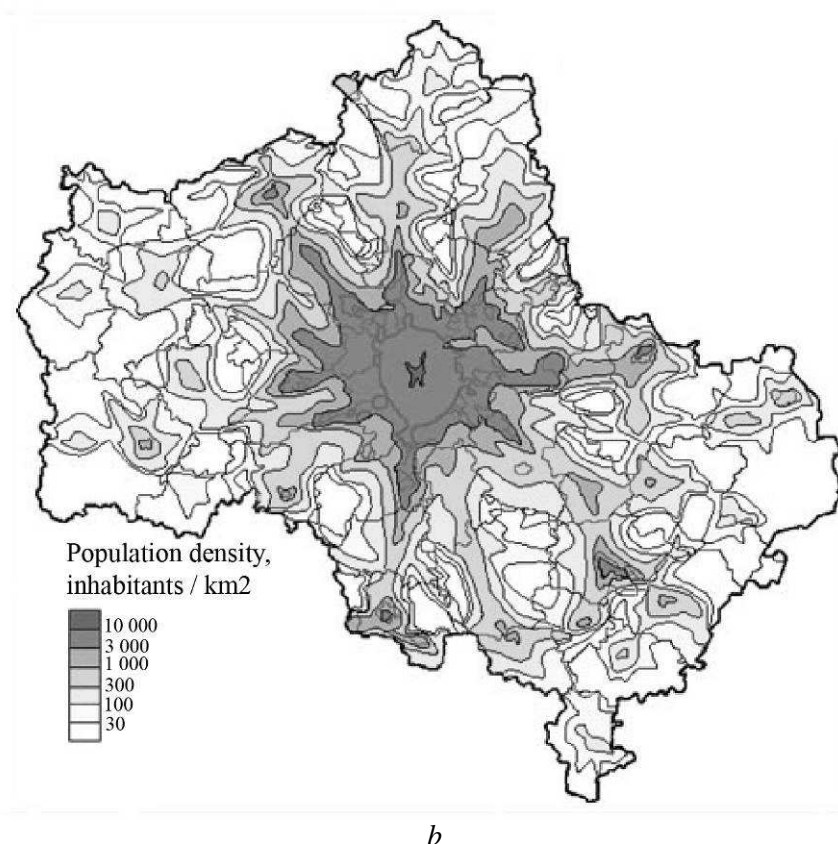
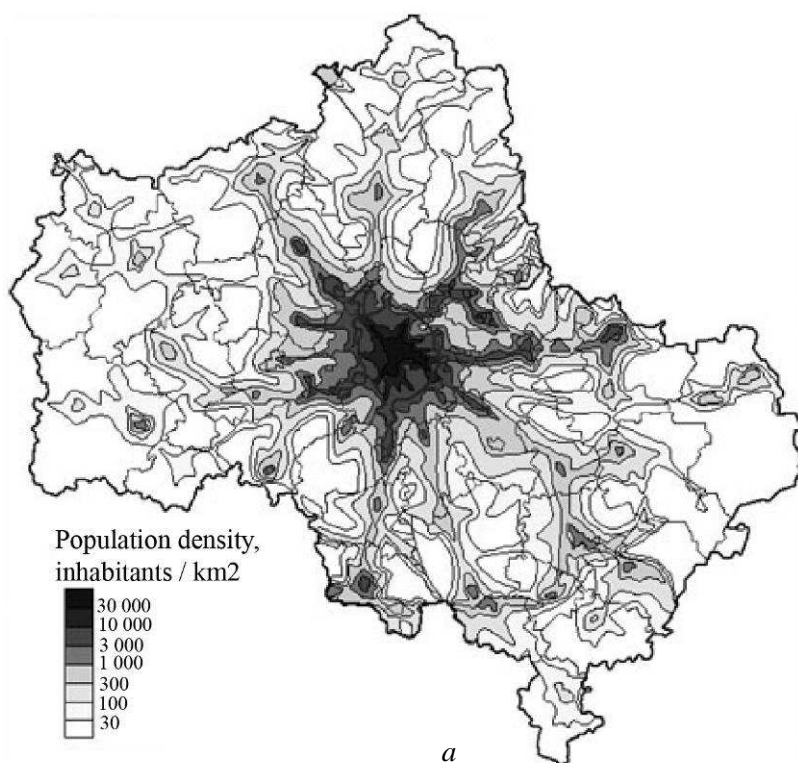


Fig. 7. Season-daily «pulsation» of density of population in Moscow agglomeration: in winter working day (*a*) and summer day-off (*b*) by A.Makhrova, T.Nefedova, A.Traywish

physics» in which «straight» corresponds to striving of ETPS to the goal which the condition of ecological balance is (see Fig. 2, stage VI), and «curve» corresponds to wave of its oscillatory development (see Fig. 2, 6). Connection of micro- and macro worlds in «urban physics» is an action of all known for the time fundamental physical interactions [2, 3].

10. Physics of absolute to some extent reminds past representations of people about the world. However there is a difference between early absolute which is passive absolute, and future absolute which knowing and active one. This is absolute of different levels, whereby any process is fractured gradually: absolute → relative → absolute-dot. Our research is belonging to transient stage «relative → absolute-dot». Passive apprehension of the world did not require presence of observer, since he did not decide anything. Then the observer was introduced into the system of apprehension, as a counter-balance to event and a part of relative. Finally, observer is not required again since he is an active component of observer-event. From this point of view the observation «from aside» lost its sense. In this sense the idea of V. Vernadsky concerning transition of biosphere into anthroposphere – the condition of Nature is driven by human mind and it could be expressed in such way: the mankind required to learn for management rather themselves, thoughts and activity than Nature.

CONCLUSIONS

1. Physics of non-absolute allows looking at laws by eyes of investigated object, from the side of event itself without change laws but discovering them under another angle of view and from other level of system integrity. The consequence of this physics is development of new theory of systems. As a result, the undulatory genetics was born as well as ethnic prognostics which are comparatively new branches of knowledge, which are attributed by active inter-disciplinary integration. Within the given context the following disciplines are developed: Genrich Altshuller (Theory of Inventive

Problem Solving), Rohn Hubbard (Dianetics) and Lev Gumilev (Theory of Passionarity) [6].

2. Main represented principles of «urban physics» of ecological space give reason for learning of new branch in science of town-planning which the wave urbanistics is – the science about management by undulatory process of territories development in order to provide sustainable development of society in direction of restoration of positive system changes taking into consideration ability of the territory (single field and ecological space) to self-arrangement at the level of cities and self-regulation at the level of regions. The leading sections of undulatory urban planning could be «town-planning theory of stability», «urban physics of ecological space» and «ecological and demographical prognostics». Here we can remember the phrase of German philosopher H. Hesle according to which at conditions of ecological crisis the key science which is able to save environment of the mankind existence is the urbanistics [21].

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ТЕОРЕТИЧЕСКИЕ ОСНОВЫ
ВОЛНОВОЙ УРБАНИСТИКИ

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Аннотация. Установлено, что все законы в Природе имеют единую основу – закон сохранения мощности. В философии этот закон известен как принцип «изменяемости неизменного», в экологии – как закон экосистемной саморегуляции, согласно которому, в условиях недонаселенности территории численность населения растет, а в условиях перенаселенности – снижается. Отмеченное свойственно и динамике развития урбанизированных территорий, как эколого-градостроительных систем. Выявлено, что в развитии этих систем в определенной мере проявлены все четыре вида физических взаимодействий. На основании полученных результатов сформулированы основные положения «урбофизики» экологического пространства, содержание которых согласовано с постулатами новой физики единого поля (бишкекская версия), что закладывает теоретические основания для появления нового направления в градостроительной науке – волновой урбанистики.

Ключевые слова: урбанистика, устойчивое развитие, экосистемная саморегуляция, экологическое равновесие, демографическая емкость, эколого-градостроительные системы.