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MODELING THE INFLUENCE OF UNIVERSITIES TO SOCIETY DEVELOPMENT

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Abstract
Paper builds a general approach to modeling the university influence to the development of society. In contrast to existing papers, obtained results make it possible to carry out analytical and computer modeling of a large number of individual processes of interaction between the universities and society.
Keywords: university, influence, society, development.

Introduction

There is a large number of scientific researches on the role and influence of universities to the social, economic and other areas of development of society. As a rule, these papers were carried out within the framework of separate scientific branches. However, a unified approach to describing such problems has not yet been built.

The paper's purpose is to develop a general approach to modeling the impact of universities to development of society as the whole.

Method for modeling

Let the social environment (society) be represented by a multidimensional smooth finite manifold M. Each point $m \in M$ of this manifold is characterized by a set (tuple) $K=K(m)$, which characterizes a given social structure (e.g., an individual or a given group of people). For example, it can be social, economic, moral and/or ethical, religious and other characteristics (both individual and group) that describe a given point. Let us arrange $K(m)$ in such a way that the "increase" in characteristics corresponds to a more developed state of society at a given point. Note that the use of a manifold implies the presence of a certain metric.

In [1] it is shown that the development of society is carried out through universities. Let's consider universities as point sources with characteristics $K(m)$ (some or all at once), which are localized at point m. Since there is no conservation laws for knowledge (information) that the values of the characteristics will increase with time t. Thus, at the point of localization of the university m_1, the value of the tuple will be modeled by a function that increases with time as follows.

$$U(K,m,t) = f(K,t) \cdot \delta(m - m_1) \tag{1}$$

Here $\delta(m)$ is the Dirac delta function.

At the boundaries of a finite manifold, boundary conditions must be set that describe the interaction of this variety (that is, a given society) with its environment. As a rule, such conditions are described by the presence of flows of the parameters of the tuple on the boundary inward and outward. It can be described as follows.

$$\left.\frac{\partial K}{\partial m}\right|_{\partial M} = \varphi(t) \tag{2}$$

Here ∂M is the boundary of the manifold M; $\varphi(m,t)$ describes the time dynamics of the flow $K(m)$ from the manifold M at the points of the boundary ∂M.

Thus, the dynamics of the tuple $K(m,t)$ on the manifold M, taking into account the results of the functioning of universities $U(K(m),t)$, can be described by such a dynamic equation with doundary conditions (2).

$$\frac{\partial K}{\partial t} = O(K,m,t) + \sum_{i=1}^{N} U(K,m_i,t) \tag{3}$$

Here $O(K,m,t)$ is an operator that describes the process of assimilation by the society of those new characteristics of the tuple $K(m,t)$ that are produced by the considered university. N is the total number of universities.

Example

Let the operator $O(K,m,t)$ be described as a diffusion process with a diffusion coefficient $D(K,m,t)$, which will describe the process of diffusion of the characteristics of a tuple from a university into society, taking into account the heterogeneity of society.

Then the influence of universities on a given society can be described as a non-linear problem in this way (Δ_m is the Laplace operator for the considered manifold).

$$\frac{\partial K}{\partial t} = D(K,m,t)\Delta_m K + \sum_{i=1}^{i=N} f(K,t)\cdot\delta(m-m_i) + \varphi(t)\cdot\delta(m-\partial M) \tag{4}$$

Introducing the Green's function $G(m,t)$ for (4) in a standard way [2], we obtain a solution for changing the characteristics of society as a result of the activities of universities in this form (in assumption that all characteristics in (4) do not depend on the value of the current tuple).

$$K(m,t) = \sum_{i=1}^{N} G_i(m,t) \tag{5}$$

Conclusions

Paper constructs a general approach to modeling the role and influence of the universities in the development of society. In contrast to existing papers, obtained results make it possible to carry out analytical and computer modeling of a large number of individual processes of interaction between the universities and society. Also, obtained results allow developing new methods for obtaining the necessary parameters and characteristics from the experiments.

References

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