IN DISCUSSION

ON FORMS OF DESCRIPTION OF MECHANICAL MODEL IN COSMOLOGY

Boyko Y.I., Kopyt N.Kh., Kopyt N.N.

Research Laboratory of Air Dispersion Systems, Odessa I.I. Mechnikov National University
nikkopyt@gmail.com

ABSTRACT. The convergence of two types of independent variables of the mechanical description is interpreted as an approach to the global numerical characterization of the manifold of a single concept of cosmology. Using the virial theorem, the validity of the identical representation of the gravitational diameter of the Schwarzschild black hole is proved. According to the methodology of the inverse problem of mechanics, the mechanical development of our world is qualitatively presented.

Keywords: set, mapping, involution, identity, black (white) holes, a single concept of cosmology.

АНОТАЦІЯ. Зближення двох типів незалежних змінних механічного опису інтерпретовано як підхід до глобальної числової характеристики багатовиду одиничного поняття космології. Для його найпростішого варіанту – сталого Всесвіту Ейнштейна, на підставі виріальної теореми вказана можливість тотожного представлення гравітаційного діаметру сфери Шварцшільда лише через її масу та швидкість світла, як універсальну сталу. По методології зворотної задачі механіки, з застосуванням зворотності одиночного відображення, надана якісна картина механічного розвитку нашого Всесвіту. Зазначено, що в ній відтворення і зникнення світу просторово-часових відносин відбувається нескінченно. Первевага нашої заміни рекурсії конформних перетворень Пенроуза (як просторово-часових узагальнень) інволюційними перетвореннями в тому, що останні більш просто використовують зворотність механічного руху як основу механічної моделі розвитку.

Ключові слова: множина, відображення, інволюція, тотожність, чорні (білі) діри, одиничне поняття космології.

The cosmological experience of a quite long observation of mechanical systems is reflected in the fact that they move in a finite region of space at speeds that do not go to infinity. If, in addition, their kinetic energy T is a quadratic function of the velocities (as the second type of independent variables), and the potential energy U is a homogeneous function of k degree of all radius vectors $\vec{r}_a$ (as the first type of independent variables), then averaging over time (with its tending to infinity to use the cosmological experiment) Euler's theorem on homogeneous functions gives the virial theorem, $2\overline{T} = k\overline{U}$. Representing it in the form

$$k = 2\overline{T}\Big/\overline{U}, \tag{1}$$

if the general form is

$$k = \frac{\vec{l} \cdot \nabla f_{(\vec{l})}}{f_{(\vec{l})}}, \tag{1a}$$

in cosmology allows the use of such a development parameter as a numerical invariant (Newtonian interaction, $k = -1$). The surface of the Schwarzschild sphere in such mechanics can be interpreted as a condition for the equilibrium of some repulsive forces, k = 1 for Eq. (1), which proves the validity of the following equation for the mapping of the Schwarzschild diameter

$$mc^2 = {m(c)^2}\Big/{2} + {m(-c)^2}\Big/{2}, \tag{2}$$

with the forces of gravitational (Newtonian) attraction. The aforesaid shows that for k values from (-1) to (+1) (and hence for k = 0, taking into account the integer value of its variation with a polynomial structure of a homogeneous function), it is universalized to characterize the position.

The counter tendency to increase the generality of the position characteristics to a numerical invariant is already manifested on the cosmological scale of the solar system level. We have previously obtained (Boyko et al., 2019; Boyko, Kopyt N.N., Kopyt N.Kh., 2019) that the numerical invariant of position can be paired with the numerical invariant of mechanical motion. Its mean for sampling including all planets, the asteroid belt and Eris was 0.599 ± 0.083, and according to Fisher's criterion, it gives better results than regression. Obtaining numerical invariants as a further convergence of the types of independent variables of the description according to (Landau & Lifshits, 1988) is an argument for the developed representation of the single concept of cosmology as homogeneity (Boyko et al., 2020), with its global numerical characteristic as a manifold, k = 0.

The connectivity of a single concept of cosmology with our world of space-time relations is determined by the reversibility of development as a mechanical motion. This is consistent with the concept of a unit (or identical) mapping (Kostrikin, 1977), since $e_X: X \to X$ is a mapping that takes each element of the set $x \in X$ into itself. In general, if the transformations of the mapping are involutive, their double application is the identity transformation (Kostrikin, 1977; Arnold, 1989). Note that the product of two mappings is not defined for any

mappings, while the product of two unit mappings not only always makes sense (of a unit mapping), but these mappings are therefore even formally inverse to each other (Kostrikin, 1977). Moreover, for the obvious relation

$$e_X \cdot e_X = e_X \quad (3)$$

no specification is required through the connectivity of space-time relations – for identity through involutiveness, connectivity through order relations is sufficient. Then the mechanical history of our world, having begun, after the involution of a single mapping from a single concept of cosmology, with the Big Bang at $t = 0$, having passed the cusp point on the time axis as a change in its direction in sign, will complete the cycle of such development by reaching the surface of the black hole of our world as a whole. The change of sign, as well as the beginning of physical time, is considered by us through the limitation of our world of space-time relations to a single concept of cosmology, since with affine transformations $r^* = \alpha r$, $t^* = \beta t$, $(\alpha/\beta)^2 = \alpha^k$ (Landau &Lifshits, 1988), and for $k = 0$, $\alpha = \pm \beta$.

Further, no longer in physical time, there will be a second involution of a single mapping into a single concept of cosmology, eternal in identity to itself. The presence of a double application of the involutive transformation according to Eq. (3), as a commutative order relation that ensures the inverse of the unit mapping, in its identity does not create a structural contradiction between the whole and the part. This can also be considered as a version of the Cantor-Dedekind axiom from set theory. At the same time, this duality can be associated with the concepts of embedding and restriction of a single mapping (Kostrikin, 1977), which allows one to develop the construction of neighborhoods of singularities for black and white holes.

References

Boyko Y.I. et al: 2019, *XXII Conference "Electrohydrodynamics of a conductive fluid"*, Yaroslavl, Russia, 3.

Boyko Y.I., Kopyt N.N, Kopyt N.Kh.: 2019, *XXVIII International Conference "Disperse systems"*, Odessa, Ukraine, 23.

Landau L. D., Lifshits E. M.: 1988, *Mehanika*, Nauka, Moscow (in Russian), 216 p.

Boyko Y.I., Kopyt N.Kh., Kopyt N.N.: 2020, *XX Gamow International Astronomical Conference-School in Odessa*, Ukraine.

Kostrikin A. I.: 1977, *Vvedenie v algebru*, Nauka, Moscow (in Russian), 496 p.

Arnold V.I.: 1989, *Matematicheskie metodyi klassicheskoy mehaniki*, Nauka, Moscow (in Russian), 472 p.