VIBRATIONAL BIOMECHANICS, THE MORPHO-RESONANCE FIELD AND CONTACT TRANSFORMATIONS

Petoukhov S.V., Petukhova E.S.

Institute of Machines Studies, Russian Academy of Sciences,
101990, Moscow, M.Kharitonievsky per., 4, Russia
E-mail: spetoukhov@gmail.com, +7915-092-8565

The work [1] describes the concept of systems of resonances in genetics and also data on relations between genetic structures and eigenvalues and eigenvectors of matrices of vibro-systems with many degrees of freedom. This line of research connects inherited biological phenomena with vibrational mechanics. [1] also describes the initial capabilities of modeling biological curved surfaces on the basis of similarities between the diagonal matrices of vibro-systems with two degrees of freedom and metric tensors, which are used in differential geometry for simulation of 2-dimensional surfaces. These analogies are laid in the basis of our development of the theory of "morpho-resonance" morphogenetic field, which exists within the body and develops in time. By definition, morpho-resonance field is a tensor field of oscillatory processes with coordinated system of resonance frequencies of oscillating systems with many degrees of freedom. In this notion we do not suppose existence of kinds of forces unknown to science. This version of the morphogenetic field for the first time links the morphogenetic field with the features of molecular genetic systems (on basis of resonance spectra). We believe that morphogenesis is a system-resonance phenomenon. In developing theoretical beginnings of morpho-resonance field, we pay a special attention to the group of conformal transformations, which generalize the group of similarity transformations. They are presented in known phenomena of conformal bio-symmetries, which generalize similarity bio-symmetries of A.V.Shubnikov, and they appear in physics in relation with the conformal invariance of equations of Maxwell's electrodynamics. Conformal transformations are a special case of contact transformations, known in optics and mechanics in the following topics: the optical-mechanical analogy; Huygens' principle; canonical equations of Hamilton; representation of mechanical motions as a continuous self-unfolding of contact transformations; gears, etc. We study a generalization of conformal bio-symmetries into contact bio-symmetries (the contact geometry of S.Lee) and we are developing an appropriate theory of morpho-resonance field - for self-unfolding morphogenesis and biological growth - with using already known applications of contact transformations and Huygens' principle in mathematical natural sciences. We study the question about characteristical (generating) functions of morphogenetic medium.

References

1. *Petoukhov S.V.* The concept of resonances in genetics («resonance bioinformatics»). - Selected works of the VII International Congress "The weak and super-weak fields and radiation in biology and medicine", 07-11 September 2015, St. Petersburg, p.1-41. - http://www.biophys.ru/lib/sci/resonance/460-resonance-00001 (in Russian).