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New mechanics-mathematical methods in natural processes

new mathematical method elaborated in Russia, that has Amechanical basis and is called the method of block element, is presented in this report. Its elaboration demanded to include areas of mathematics of high level: topology, external analysis, factorization methods, integral geometry, automorphisms and other areas of mathematics. The numerical-analytical method is created to explore and solve any spatial boundary problems for systems of differential equations in partial derivatives, linear and nonlinear. Its difference from the finite and boundary element methods consists in absence of any discretization. It solves precisely all boundary problems which are solved precisely by other methods, for example, separation of variables. Among advantages of the method are mechanical characteristics detected in the process of solving problems, tension and displacement, and not density on the boundaries of domains of boundary problems, lack of necessity of diagonalization of operators of the system of differential

equations, opportunity to use numerous works of scientistsmechanics in areas of differential and integral equations on some stages of applying the method. The method allows to carry out investigation in conversational mode, that allows to detect regularities connected with characteristics of solution and its characteristics. There are also particular difficulties in applying the method of block element, which are caused in the first place by requirement of quite high level of knowledge of mathematics used by its application. The results of applying this mechanics-mathematical approach to different boundary problems which were not studied before have been gotten. These are problems of the strength theory, materials science, seismology, climatology, nanomaterials. Problems of seismology are connected with mechanical harbinger of seismicity based on the estimate of concentration of strains on tectonic faults.

Biography

Vladimir A. Babeshko has completed his HD (Doctor of Mechanics) in 1974 from Russian Academy of Sciences. For many years he is a Chief of Scientific-Research Center for Forecasting and Preventing Geo-ecological and Technologic Disasters Kuban State University and Southern Research Center, Russian Academy of Sciences. He has 20 patents, published 7 monographs and more than 450 papers in reputed journals such as Russian Academy of Sciences and many others.

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