6th World Congress on
Climate Change and Global Warming

New mechanics - mathematical methods in environment

A new mathematical method created in Russia, that has a mechanical basis and is called the method of the 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 the 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 scientists-mechanics in areas of differential and integral equations on some stages of applying the method. The method allows carrying out an investigation in a conversational mode, that allows detecting regularities connected with characteristics of the solution and its characteristics. There are also particular difficulties in applying the method of the block element, which is caused in the first place by the requirement of quite a 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 a mechanical harbinger of seismicity based on the estimate of the concentration of strains on tectonic faults.

Vladimir Babeshko

[1]South Scientific Centre Russian Academy of Sciences, Russia

[2]Kuban State University, Russia

Biography

Vladimir Babeshko has completed his HD (Doctor of Mechanics) in 1974 from Russian Academy of Sciences. During many years he is a chief of Scientific-Research Center for Forecasting and Preventing Geoecological and Technologenic 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.

babeshko41@mail.ru