

Dynamics of the size-dependent plates based on reduction of the problem dimension

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Abstract: We are aimed on reduction of the solution of the partial differential equation to the solution of an ordinary differential equation. One of the possible approach is a method based on the Bubnov-Galerkin procedure, which is aimed on reduction of the iterative procedure for independent variables of the problem, and the solution of the partial differential equation to the solution of ordinary differential equations. In the Russian scientific literature the latter method was called the method of variational iterations (MVI). MVI was widely used by many researchers in solving problems of the theory of shells and plates. The authors of this work, since the 70s of the last century, has been used this method to solve geometrically, physically nonlinear and contact problems of the theory of plates and shells for full-size systems. In a number of their works, the authors give a justification of this method for a class of equations described by positive definite operators. In the presented paper, MVI is used in plate nanomechanics problems and a proof of MVI convergence for the problems under consideration is given. It should be noted the following advantages of MVI. When implementing the MVI procedure, there is no need to construct an initial approximation that satisfies, for example, the boundary conditions of the task. MVI allows to obtain the symmetry of the approximate solution, if it is inherent in the exact solution of the problem.

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