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Application of generalized differential quadrature method to two-dimensional problems of mechanics. (Russian. English summary) Zbl 1421.74042

Summary: The application of the generalized differential quadrature method to the solution of two-dimensional problems of solid mechanics is discussed by an example of the sample analysis of vibrations of a rectangular plate under various types of boundary conditions. The differential quadrature method (DQM) is known as an effective method for resolving differential equations, both ordinary and partial. The main problems while using DQM, as well as other quadrature methods, are choosing the distribution for construction of the points grid and determination of the weight coefficients, and incorporating boundary conditions in the resolving system of linear algebraic equations. In the present study a generalized approach to accounting the boundary conditions is proposed and a universal algorithm for the composition of a resolving algebraic system is given. In the paper it is shown by an example of model analysis of a rectangular plate vibrations that the DQM allows us to effectively resolve two-dimensional problems of solid mechanics gaining an acceptable accuracy with a relatively small number of points on the grid. The latter is provided by the aid of the classical non-uniform Chebyshev-Gauss-Lobatto distribution and generalized approach to accounting of the boundary conditions.

MSC:
74H45 Vibrations in dynamical problems in solid mechanics
74K20 Plates

Keywords:
differential quadrature method; numerical methods; differential equations; eigenfrequencies; rectangular plate

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References:

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