NUMERICAL RESEARCH OF CONVERGENCE OF DISCRETE SINGULARITIES METHOD IN THE DYNAMIC PROBLEMS OF THIN ELASTIC PLATES WITH CRACKS

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Today we are surrounded by thin-wall structures. They are widely used in construction, mechanical engineering, shipbuilding and aircraft building, road construction and many other industries. Therefore, the development of methods for calculation of deformations occurring in plates is a very important problem. We consider the dynamic problem for thin elastic plates weakened by cracks in the framework of the Kirchhoff model. The problem of the dynamics of infinite thin elastic plates weakened by cracks was considered in [2]. The research method is based on the scheme developed in [1] for problems of elastic wave diffraction on spatial cracks. The problem is reduced to a system of nonstationary boundary equations using the sum of dynamic analogues of single-layer and double potentials. The solvability of these problems is proved in the one-parameter scale of Sobolev spaces in [3]. The resulting boundary equations allow to determine the displacement of any point of the plate at any given time without the use of methods like finite differences and finite elements. In the talk we present the numerical solution for systems of non-stationary boundary equations, which is obtained via the method of discrete singularities. To justify the convergence in this numerical convergence, we change the grid for the spatial variable in the problem under load in the form of a smooth pulse to study. A comparison was also made of the middle plane points displacement of the plate at different time steps. The results were also compared with other authors [4]. The relative error of calculations is 5%. Thus, it allows to make a conclusion about method convergence.

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