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SOLUTION OF THE PROBLEM OF STATIONARY HEAT CONDUCTION FOR A LAYERED PLATE

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Elements of engineering structures are operated in conditions of a wide range of temperature changes [1, 2]. This leads to the need to take into account the influence of the temperature field when calculating their stress-strain state, but first it is necessary to solve the corresponding problems of thermal conductivity. For objects with a layered structure, problems of thermal conductivity with ideal thermal contact between layers are mainly solved [3, 4]. In reality, there may be a thin intermediate layer of some material between the contacting layers, therefore, among the boundary value problems of thermal conductivity and thermoelasticity, the problems for layered structures with non-ideal thermal contact between the layers are of significant interest. Plates are important elements of various engineering structures, therefore, the study of their deformation characteristics under the influence of thermal loads is an urgent task.

The work considers a three-dimensional stationary heat conduction problem for a layered plate with non-ideal thermal contact between the layers, for which an exact analytical solution is constructed. Temperature distributions are given on the upper and lower surfaces of the plate. The problem is solved using a double integral Fourier transform. The temperature in the layers is represented as a linear combination of two auxiliary functions. The solution of the problem is obtained in a form convenient for numerical implementation. The obtained temperature distributions were compared with the results obtained by other methods. In the future, it is planned to apply the specified method to solving the problem of thermoelasticity [5] for a layered plate with non-ideal thermal contact.

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