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On the stress state of thin-walled isotropic building constructions of the shell type

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Abstract

© Published under licence by IOP Publishing Ltd. The stress-strain state of elastic inhomogeneous isotropic shallow thin-walled shell constructions is studied in the framework of S.P. Timoshenko shear model. The stress-strain state of shell constructions is described by a system of the five equilibrium equations and by the five static boundary conditions with respect to generalized displacements. Equilibrium equations are second-order partial differential equations that are linear with respect to tangential displacements, rotation angles, and non-linear with respect to normal displacement (deflection). The aim of the work is to find generalized displacements from a system of equilibrium equations that satisfy given static boundary conditions. The research is based on integral representations for generalized displacements containing arbitrary holomorphic functions. Holomorphic functions are found so that the generalized displacements should satisfy five static boundary conditions. The integral representations constructed in this way allow to obtain a nonlinear operator equation with respect to the deflection. The solvability of the nonlinear equation with respect to deflection is established with the use of contraction mappings principle.

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Keywords

building constructions of the shell type, equilibrium equations, generalized displacements, integral representations, static boundary conditions, stress-strain state

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