

# On the existence of solutions to geometrically nonlinear problems for shallow Timoshenko-type shells with free edges

Timergaliev S.

*Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia*

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## Abstract

In the paper we investigate the solvability of the boundary-value problems for shallow isotropic elastic shells within the framework of Timoshenko's shear model. The considered problems are nonlinear geometrically and linear physically. The method of studying consists in reducing the initial system of equilibrium equations to one nonlinear differential equation with respect to deflections. In doing so integral representations for the tangential displacements and angles of rotation play a significant role. The representations are deduced by making use of general solutions to the inhomogeneous Cauchy-Riemann equation. The solvability is established by the principle of contracting mappings. © 2014 Allerton Press, Inc.

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## Keywords

boundaryvalue problem, existence theorem, generalized displacements, generalized problem solution, holomorphic functions, integral equations, integral representations, operator, Sobolev spaces, system of equilibrium equations, Timoshenko-type shell