Comparative analysis of some mathematical models of cusped prismatic shells

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Abstract

We consider different hierarchical models of the prismatic shells; namely, suggested by I.Vekua (see, I. Vekua, Shell Theory: General Methods of Construction. Pitman Advanced Publishing Program, Boston-London-Melbourne, 1985.), when on the face surfaces of the prismatic shell either stresses, or displacements, or neither stresses nor displacements are prescribed and offered in the present work hierarchical models, when on the face surfaces of the prismatic shell the stress and displacement vector components are mixed prescribed. Mathematically, considering cusped elastic prismatic shells (see, G. Jaiani,Cusped Shell-like Structures, SpringerBriefs in Applied Science and Technology, Springer-Heidelberg-Dordrecht-London-New York, 2011), we arrive at different governing systems of degenerate partial differential equations with different kind of degeneracy of the order of the equations. The governing systems in the cases of dynamical and static problems are degenerate hyperbolic and elliptic ones, respectively. Setting initial conditions does not depend on the order degeneration, while setting boundary conditions does it. Exact criteria how to set correct boundary conditions are established. Comparative analysis of different situations for different models are carried out. Mechanical interpretation of the correct setting of boundary conditions is given.

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