ON OSCILLATIONS AND STABILITY OF ORTHOTROPIC SHELLS OF ROTATION, CLOSE TO THE CYLINDRICAL ONES

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We introduce eigen oscillations and stability of orthotropic shells of rotation, close by their shape to cylindrical ones, under the action of meridional stresses uniformly distributed on the shell edges and normal pressure uniformly distributed on the shell surface. We consider the shells of middle length whose middle surface element is described by the parabolic function. On the basis of the theory of shallow shells the resolving equation for oscillations of corresponding prestressed shell is obtained. This equation is an isotropic case differs from the well-known one by an additive term which may be of same order as another terms.We consider the shells of positive and negative aussian curvature. Shell edges are assumed to be simply supported. In dimensionless form we present formulas and universal curves of dependence of the least frequency, critical stresses and forms of wave formation on the parameters of orthotropy, preliminary stress, Gaussian curvature and on the amplitude of shell deviation from the cylinder. It is shown that in the presence of preliminary stresses the orthotropy parameters and shells deviation from cylindrical form (order of thickness) may essentially change the lower frequencies, the critical stress and forms of wave formation of the corresponding prestressed orthotropic cylindrical shell. It should be noted that for convex shells under preliminary pressure the influence of an elastic axial parameter is stronger than of an elastic circumferential parameter, while for concave shells the situation is opposite. However, for shells under preliminary tension the leading role of one or another parameter of orthotropy may be changed depending on the magnitude of preliminary stress and Gaussian curvature.