

Shells subjected to mechanical and thermal loads and corrosion

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Abstract: Two mathematical models of flexible shallow shells have been derived, taking the account of the geometric non-linearity: (i) mathematical model under coupled temperature and deformation (equations in terms of displacements) fields; (ii) mathematical model taking into account also physical non-linearity. In both models, the one-sided corrosion wear has been taken considered in terms of Dolinskii and Gutman models. We have proposed and successfully employed the method to decrease the order of the governing equations and to conduct their linearization by reduction of the problem to study the bi-harmonic equation. In order to solve the reduced problem numerically, the method of variational iterations (MVI) and the method of variable stiffness parameter have been used. It has been shown that the velocity of the decrease in the plate thickness depends essentially on the load. The change in plate thickness depends on the chosen (Dolinskii or Gutman) model. The studied plates reach the strength material limit practically with the same volume, but after different time intervals.

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