

Asymptotic approach to modeling of thin-walled structures with initial stresses

The problem of derivation of model of thin-walled structures with initial stresses from three dimensional problem is considered. It is demonstrated that all traditional models of plate and beam with initial stresses, as well as models of membrane and string, can be derived by the method of asymptotic expansions from the so called three dimensional linearized problem of elasticity theory with initial stresses. The terms corresponding to initial stresses are generated by asymmetrical part of the coefficients of the mentioned problem (coefficients of the problem with initial stresses loss some symmetries which elastic constants have).

The asymptotic approach works for inhomogeneous structures (composite, framework, etc.) for which notions of the classical theory of thin-walled structures (middle surface, hypothesis of non deformable normal, etc.) cannot be introduced or become non valid.

There are presented new results on the derivation of model of thin-walled structures with initial stresses with unilateral contacts.

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