Stress-strain state and stability of composite sandwich shells with a scaling zone between the core and facings

Golovanov A., Pajmushin V.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

A finite element model is presented for analysing the strength and stability of sandwich shells of arbitrary configuration with an adhesion failure zone between the core and one of the facings. The model is based on the following assumptions: both facings are laminated Timoshenko-type composite shells; in the core only transverse shear stresses and normal stresses in the thickness direction have non-zero values; in the adhesion failure zone a free slip in the tangential plane, and a unilateral contact along the normal are possible; in the stability problem the prebuckling state is assumed to be linear. Displacements and rotation angles of the normals towards the facings, as well as stresses in the core are taken as global degrees of freedom. The algebraic problem is solved by using a special step-by-step procedure of determining the contract area in the scaling zone and employing unilateral restrictions to some of the unknowns. Numerical examples are also given.