

Reissner-Mindlin-Von Karman Type Plate Model for Postbuckling Analysis of Laminated Composite Structures

Petri Kere⁽¹⁾, Mikko Lyly⁽²⁾

(1) *Institute of Applied Mechanics and Optimization, Tampere University of Technology, Tampere, Finland*

(2) *Center for Scientific Computing, Espoo, Finland*

Postbuckling behaviour of laminated composite structures using Reissner-Mindlin-Von Karman type plate model is considered. The potential energy functional where the linearized strain tensor has been replaced by nonlinear functions, i.e., the Von Karman model for large deformation is formulated. The fourth-order tensors connecting membrane stress resultants and bending moment resultants to membrane strains and curvatures, respectively, and the coupling one for in-plane and flexural behavior as well as the second-order tensor connecting transverse shear forces to transverse shear strains are defined according to the Classical Lamination Theory. In the FE-implementation linear triangular elements are used. The transverse shear strains are discretized by the stabilized MITC-technique of Brezzi, Fortin, and Stenberg. The normal rotation (drilling rotation) is introduced as an auxiliary function and discretized by the stabilized method of Hughes and Brezzi. Load-displacement behaviour of the structure as well as the failure prediction and the identification of the critical areas of the model are illustrated with numerical examples.

[View the extended summary](#)