Abstract

Ahmed Y Elroubi

Buckling and Post Buckling Behavior For Unsymmetrical Laminates Part I: Curing Cycle

This is the first of two companion papers that examine the elastic buckling and post-buckling behavior of thin unsymmetric cross-ply laminates. When cured in a flat mold these panels possess two cylindrical equilibrium configurations. From stability perspective this problem is identified as a bifurcation buckling problem. As explained in literature thermal mismatch between plies and existing geometric imperfections triggered this behavior. Therefore, and according to Koiter it is necessary to measure and account for these geometric imperfections to accurately predict the cured shapes. Since imperfection measurement is challenging and cannot be possible in the stage of design. This work applies a unified finite element methodology based on Koiter’s theory to predict the cured shapes. This methodology is consistently applied in commonly used finite element computer codes, ABAQUS, ANSYS and LS-DYNA, and their predictions are compared.