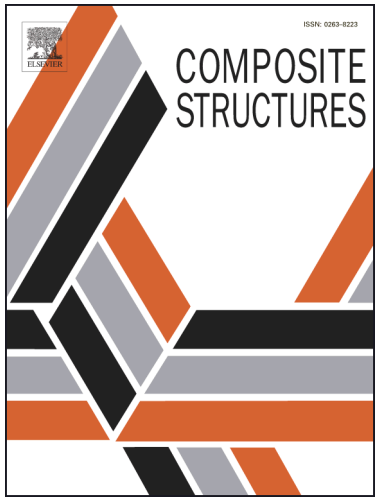

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Isogeometric finite element approach for thermal bending and buckling analyses of laminated composite plate

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Abstract

Temperature rise in a plate structure produces non-zero transverse normal strain. Thus, a six-variable quasi-3D model with one additional variable in transverse displacement of higher-order shear deformation theory (HSDT) is developed in this paper to take into account the effects of transverse shears and normal strain in a laminated composite plate. The governing equation is discretized by isogeometric analysis (IGA), which naturally fulfills the C^1-continuity requirement of the plate model. Due to the presence of bending-extension coupling, two kinds of thermal plate issues are considered – thermal buckling and thermal bending phenomena. Several numerical examples are provided to show the accuracy of the present method compared to reference results. Furthermore, it has been confirmed that the transverse normal strain cannot be discarded, especially for thick plates under a temperature environment.

Keywords: Laminated composite plate, isogeometric analysis, thermo-elastic, higher-order shear deformation theory (HSDT) and quasi-3D model.

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