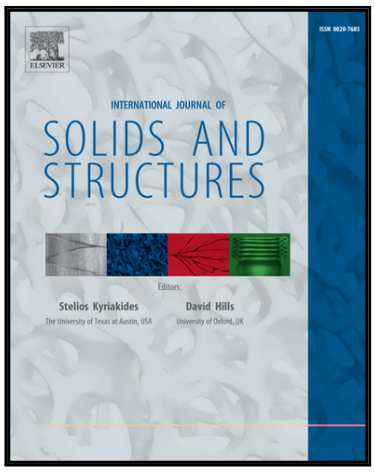


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## Abstract

Direct numerical simulations based on three dimensional finite element analysis were performed to investigate the mechanical behavior of knitted textiles at the scale where their manufactured material architecture can be simulated and assessed. A numerical investigation of the effects that the material architecture has on deformation localizations, as well as both in- and out-of-plane displacements is presented. To achieve this, a procedure to numerically synthesize and modify knitted textile geometries is investigated which takes into account yarn-to-yarn interactions, while it further allows meshing used in finite element analyses. Appropriate boundary conditions are applied to avoid unnecessary constraints, while a specific type of interaction definition between yarn surfaces is enforced to remove the effect of contact and friction. Furthermore nonlinear analysis is used to capture the geometrically significant yarn position changes resulting from