

Dynamic Relaxation and Isogeometric Analysis for Finite Deformation Elastic Sheets with Combined Bending and Stretching

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Abstract : Recent years have seen a rising interest in study and applications of materially uniform thin-structures (plates/shells) subject to finite-bending and stretching deformations. We introduce a well-posed 2D-model involving finite-bending and stretching of thin-structures to approximate the three-dimensional equilibria. Key features of this approach include: Non-Uniform Rational B-Spline (NURBS)-based spatial discretization for finite elements, method of dynamic relaxation to predict stable equilibria, and no a priori kinematic assumption on the deformation fields. The approach is validated against the benchmark problems, and the use of NURBS for spatial discretization facilitates exact spatial representation and computation of curvatures (due to C1-continuity of interpolated displacements) for this higher-order accuracy 2D-model.

Keywords : Isogeometric Analysis, Plates/Shells , Finite Element Methods, Dynamic Relaxation

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