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Subdivision surfaces: A new paradigm for thin-shell finite element analysis. (English)

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From the summary: We develop a new paradigm for thin-shell finite element analysis based on the use of subdivision surfaces for (i) describing the geometry of the shell in its undeformed configuration, and (ii) generating smooth interpolated displacement fields possessing bounded energy within the strict framework of Kirchhoff-Love theory of thin shells. The particular subdivision strategy adopted here is loop scheme, with extensions such as required to account for creases and displacement boundary conditions. The displacement fields obtained by subdivision are H^2 and, consequently, have a finite Kirchhoff-Love energy. The resulting finite elements contain three nodes, and element integrals are computed by a one-point quadrature.

MSC:

74S05 Finite element methods applied to problems in solid mechanics
74K25 Shells

Keywords:

interpolation scheme; Kirchhoff-Love thin shell; thin-shell finite element; subdivision surfaces; smooth interpolated displacement field; loop scheme; finite Kirchhoff-Love energy; one-point quadrature

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