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Geometry Based Rational Enrichment Functions for Triangular Plane Elasticity Element

Juha Makipelto

Institute of Applied Mechanics and Optimization, Tampere University of Technology, Tampere, Finland

In the p-version of the finite element method elements are often large and their shape can be very complicated. In this paper the sides of the plane elasticity triangular element are allowed to be rational Beziér curves, and the element geometry is mapped by the blending function method. If only the typical hierarchic polynomial shape functions are used for the displacement field approximation, the element with rational sides is able to reproduce neither rigid body rotation nor constant strain state, so it is not complete. In this paper we present how the element can be made complete by enriching the shape function space with rational functions, which are simply a part of the geometry mapping functions. A numerical example shows that the element enriched with these rational shape functions works better than the one without enrichments.

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