

A new 3D 6-node solid finite element based upon the 'Space Fibre Rotation' concept

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Abstract

This paper presents the development of a new 6-node solid wedge element with three translational and three rotational degrees of freedom per node. It is based on the model Space Fibre Rotation (SFR). Using the rotation of a material fibre in 3D space, the SFR approach allows to get a more accurate displacement field, which becomes quadratic without changing the number of nodes of the element. It is economical since only two integration points are used. In order to evaluate the usual element stiffness, a small penalty stiffness is introduced so that no zero energy modes appear while preserving the advantage of reduced integration. Several benchmark tests have demonstrated the improved performance of the present element.

Keywords : 3D finite element, wedge element, Space Fibre Rotation, zero-energy modes.

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