HEXAHEDRAL SOLID ELEMENTS WITH ENHANCED STRAINS

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Enhanced and mixed enhanced finite elements [1-10] became popular in recent years in numerical simulations for both linear and non-linear applications. Three types of hexahedral solid elements are considered: i) a mixed enhanced finite element with strains assumed in Cartesian coordinates, ii) a mixed enhanced finite element with strains assumed in natural element coordinates, iii) a Trefftz-type finite element. For the Trefftz-type finite element stresses are used which satisfy both the equilibrium equations and the compatibility equations in the element domain. The stresses for the 3D elasticity case can be constructed using complex representations, which are discussed in reference [11].

The implementation issues of the different hexahedral solid elements include the possibility of using orthogonal stress and strain functions. Exact integration is possible for all elements considered. The performance of the different enhanced hexahedral solid elements is shown for a series of test examples, and results from other elements are included.

References

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