

Trivariate local lagrange interpolation and macro elements of arbitrary smoothness

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Abstrak

Michael A. Matt constructs two trivariate local Lagrange interpolation methods which yield optimal approximation order and C_r macro-elements based on the Alfeld and the Worsey-Farin split of a tetrahedral partition. The first interpolation method is based on cubic C_1 splines over type-4 cube partitions, for which numerical tests are given. The second is the first trivariate Lagrange interpolation method using C_2 splines. It is based on arbitrary tetrahedral partitions using splines of degree nine. The author constructs trivariate macro-elements based on the Alfeld split, where each tetrahedron is divided into four subtetrahedra, and the Worsey-Farin split, where each tetrahedron is divided into twelve subtetrahedra, of a tetrahedral partition. In order to obtain the macro-elements based on the Worsey-Farin split minimal determining sets for C_r macro-elements are constructed over the Clough-Tocher split of a triangle, which are more variable than those in the literature.