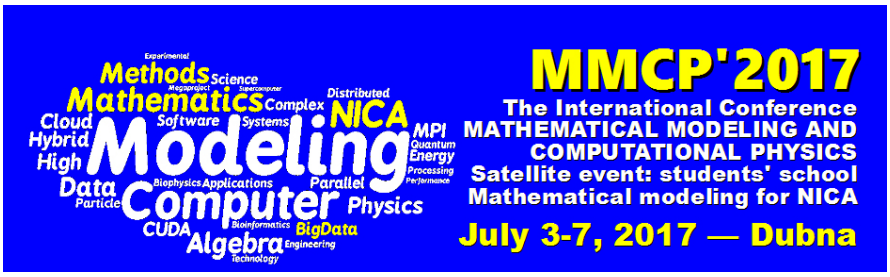

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High-Accuracy Finite Element Method for Elliptic Boundary-Value Problems

Thursday 6 July 2017 14:15 (15 minutes)

High-accuracy finite element method for elliptic boundary-value problems is presented.
The basis functions of finite elements are high-order polynomials, determined from a specially constructed set of values of the polynomials themselves, their partial derivatives, and their derivatives along the directions of the normals to the boundaries of finite elements.
Such a choice of the polynomials allows us to construct a piecewise polynomial basis continuous on the boundaries of elements together with the derivatives up to a given order. In present talk we show how this basis is applied to solve elliptic boundary value problems in the limited domain of multidimensional Euclidean space, specified as a polyhedron.
The efficiency and the accuracy order of the finite element scheme, algorithm and program are demonstrated by the example of exactly solvable boundary-value problem for a triangular membrane, depending on the number of finite elements of the partition of the domain and the number of piecewise polynomial basis functions.

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