

Quadrature for Meshless Methods

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It is well-known that creating effective quadrature schemes for Meshless Methods (MM) is an important problem (see, *e.g.*, A stabilized conforming nodal integration for Galerkin mesh free methods, J.-S. Chen, C.-T. Wu, S. Yoon, and Y. You, *Int. J. Numer. Meth. Engng.* 2001; **50**:435–466). In this talk we discuss quadrature schemes for MM of order one (MMs that reproduce linear functions). We consider the Neumann Problem and derive an estimate for the energy norm error between the exact solution and the quadrature approximate solution in terms of the mesh parameter and quantities that measure the relative errors in the stiffness matrix, in the lower order term, and in the right-hand side vector, respectively, due to the quadrature. The major hypothesis in the estimate is that the quadrature stiffness matrix has zero row sums, a hypothesis that can be easily achieved by a simple correction of the diagonal elements. Remarks will be made about the related problem of quadrature for Generalized Finite Element Methods. This is joint work with Ivo Babuška, Uday Banerjee, and Helen Li.