

Quasi Monte Carlo Sampling for Numerical Integration of Meshfree Approach

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A numerical quadrature scheme for finite elements on the boundary of analysis domain in the meshfree method is proposed in this paper. Generally, the structured grid is regarded as finite elements and the boundary surface of analysis domain lacks consistency with the surface of finite elements in the meshfree method. In the Newton-Cotes quadrature scheme, the weight of each sampling point is the integral of Lagrange basis polynomials over the integration region. Here, the weight calculation and the numerical quadrature computation of weak-formed governing equation can be performed with different sampling points. In our quadrature scheme, the weight of sampling point in the Newton-Cotes quadrature is calculated with quasi Monte Carlo sampling and the numerical quadrature of weak-formed governing equation is carried out on the small number of Newton-Cotes sampling points. Some numerical examples with SX-FEM are presented to evaluate the performance of current approach.

Keywords: Numerical Integration, SX-FEM, Newton-Cotes Integration, Meshfree Method