

Spline-Based Meshfree Method with extended basis and its Application to Nonlinear Analyses

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In this work, basis extension is introduced to the spline-based meshfree method (SBMFM) to stabilize its solution. In the SBMFM, it is highly probable that an extremely small trimmed element is produced by the trimming curves that represent analysis domain boundaries. When that element is assembled in the global system matrix, it can amplify the condition number of system. In order to resolve the instability problem, the extension technique of the weighted extended B-spline (WEB-spline) is adopted in the SBMFM. For the essential boundary condition imposition in the SBMFM with extended basis, Nitsche's method is implemented. Through the numerical examples, the presented SBMFM with extended basis proved its validity and effectiveness. The extended basis will be employed in nonlinear analysis of the SBMFM. The nonlinear problems such as metal forming processes will be analyzed with SBMFM.

Keywords: Spline-Based Meshfree Method (SBMFM), weighted extended B-spline (WEB-spline), spline finite element method, isogeometric analysis