Smoothed point interpolation method (S-PIM): A brief history and recent developments

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Abstract

The paper first presents a brief overview of the smoothed point interpolation method (S-PIM) which are formulated based on the weakened weak formulation with G space theory and generalized gradient smoothing operation. The S-PIM works naturally well with triangular/tetrahedral background meshes which can be generated in an automotive way. By properly soften the overly-stiff stiffness, S-PIM models generally possess a number of good properties, including upper bound, lower bound, superconvergence, free of locking, and ultra-accuracy. The applications of S-PIM for various problems have been briefly introduced and the emphases was put on the recent development about an improved total variation diminishing (TVD) scheme for solving convective equation and immersed smoothed point interpolation method (IS-PIM) for solving fluid-structure interaction (FSI) problems.

Keywords: smoothed point interpolation method; weakened weak (W2) formulation; convective equation; fluid-structure interaction