FUNDAMENTAL STUDY ON LEAST SQUARES MOVING PARTICLE SEMI-IMPLICIT METHOD

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The strong-form meshfree/particle methods such as Smoothed Particle Hydrodhynamics (SPH)[1] method and Moving Particle Semi-implicit (MPS)[2] method have been shown to be useful in engineering applications especially based on fluid dynamics; however, generally speaking, their basic discretization schemes are not consistent except under very limited conditions. Moreover, they had difficulties on enforcing some specific boundary conditions.

With taking particular attention to that controversies, we develop a new consistent fully-Lagrangian particle method named Least Squares Moving Particle Semi-implicit (LSMPS) method[3,4], which includes high-order consistent spatial/time discretization schemes and generalized treatment of boundary conditions.

Confirming unmistakable superiority of LSMPS method over the existing MPS method on some 2D Benchmark problems has been demonstrated[3,4]. In this research, we present obvious primacy of LSMPS method on 3D Benchmarks.

Utilizing LSMPS method for analysis of incompressible flow with the free surfaces provides satisfaction of arbitrary higher-order consistency and drastic enhancement of numerical accuracy and stability.

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