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An Enhanced Hermite-type Meshfree Method for Solving Hyperbolic-Type Equation by Using Pseudo-particle Method

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Summary

An enhanced Hermite-type meshfree method, Hermite-type Moving Least Squares Approximation [1] with Discontinuous/Discontinuous-Derivative Basis Functions (HMLSA-DBF), is proposed for solving hyperbolic-type equations. In virtue of the values of function and function derivatives at sampling points, the function can be recovered more accurately comparing with the conventional meshfree approximation. By introducing Discontinuous/Discontinuous-Derivative Basis Functions to Hermite-type MLSA, the enhanced meshfree approximation can recover discontinuous functions or functions with discontinuous derivatives accurately. The essential idea of Pseudo-particle Method in Cubic Interpolated Pseudo-particle Method/Constrained Interpolation Profile [2][3][4] Method (CIP) is employed to solve advection terms of the hyperbolic-type equations. Numerical examples for one- and two-dimensional problems indicate that the proposed method is a stable and less diffusive method for solving hyperbolic-type equations with regularly and irregularly distributed nodes. The superior convergence properties are revealed by convergence studies.

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