

An approach for instability in discontinuous smoothed particle hydrodynamics (DSPH) method

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Discontinuous smoothed particle hydrodynamics (DSPH) method is based on traditional SPH method and can be used in the simulation of discontinuous physics problems. Though DSPH method has a good application prospect, it is associated with an inherent numerical problem which is instability. In this paper, the instability of DSPH method is investigated. We consult the theory of restoring particle consistency in SPH (RSPH), which have shown good results in the improvement of accuracy and stability in nonuniform distributed particles. The Multidimensional RDSPH method is proposed by the combine of RSPH method and DSPH method and takes the advantage from both of them. A series of numerical studies have been carried out to verify the accuracy in both of interface and interior region. Furthermore, the collision of rubber cylinders is simulated. It is found that the new method have high accuracy and stability in solving the discontinuous problems.

Keywords: DSPH, Interface, Stability, Kernel consistency, Rubber cylinder