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Resolving Discontinuous Interfaces of Multiphase Flows Using a Material Point Method[1] XIA MA, DUAN ZHANG, QISU ZOU, PAUL GIGUERE, Los Alamos National Laboratory — Numerically tracking oscillating sharp interfaces in multiphase flows imposes a great challenge, especially when the phases have different constitutive relations. It is demonstrated here that the material point method (MPM) is a powerful way to tackle these kinds of problem. For instance, in the case of fluid structure interaction, the elastic stress in the solid structure and viscous stress in the fluid can be calculated accurately in the MPM method because Lagrangian points can be used to track the history of solid deformation and the fluid phase can be calculated with Eulerian method. This combination has been implemented in our code CartaBlanca. We show that the MPM method has a big advantage over a pure Eulerian method when a moving and oscillating interface is to be clearly maintained for long time. We will also show simulation of a GNEP project (Global Nuclear Energy Partnership). In this simulation, a sharp wall/fluid moving interface is tracked in order to predict a possible accident. The results will show the effects of thermal expansion and flow-structure interaction on the speculated accident.

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