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Numerical Simulation of Immiscible Multiple Fluids Flow by Diffuse Interface Model KOHEI OKITA, KENJI ONO, VCAD System Research Program, RIKEN — A diffuse interface model for immiscible multiple fluids is developed by modifying a free energy model for binary fluid. The present free energy model, in which an interface is indicated by two different order parameters unlike the usual diffuse interface model, includes a term for immiscibility of each order parameter and interaction terms of gradient energy. Then, Cahn-Hilliard & Navier-Stokes system with the diffuse interface model for immiscible multiple fluids are proposed. Firstly, in order to examine the immiscibility of triple fluids with the present free energy model, the time evolution of the order parameters is solved by the one-dimensional Cahn-Hilliard equation only. The immiscibility of fluids is reasonably satisfied as the order of 10^{-5} in an equilibrium state. Secondly, we reproduce the equilibrium angle at the triple junction by changing the combinations of surface tension. The results of the angle are good agreement with that derived from the theory of Neumann Triangle in wide range from 40 to 170 degrees. At the presentation, the equilibrium shapes of a droplet in two different fluid interfaces and the motion of two immiscible droplets with Boussinesq approximation will be demonstrated by three-dimensional calculation.

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