Simulations of Droplets Falling on a Solid Surface Using Phase-Field Method

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Due to the accident of Fukushima-Daiichi nuclear power plants, we need to construct the numerical model which we can predict the condition of nuclear fuel which cannot cool in nuclear reactor. In this study, we focus on the phenomena where the molten fuel on a surface of cladding tube fall down and construct a two-phase flow model coupled phase-field method and Navier-Stokes equation. Here, we consider surface tension in Navier-Stokes equation as a body force and introduce wetting property using Neumann condition as boundary condition. As a result of simulations using the developed model, we can confirm the droplet on a wall surface with gravity fall down and its boundary condition express dynamic contact angle.

Keywords: Two-phase flow, Phase-field method, Contact angle, Droplet