

Abstract Submitted
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Numerical simulation of convective evaporation of a droplet on a porous surface¹ MOONHYEOK CHOI, GIHUN SON, Sogang Univ — Numerical simulation is performed for droplet evaporation on a porous surface under an external flow condition. The droplet interface is tracked by a level-set (LS) method, which is modified to include the effects of porosity and evaporation coupled to heat and mass transfer. The conservation equations of mass, momentum, energy and vapor fraction for the external fluid region are combined with the local volume averaged conservation equations for the porous region through the matching conditions of velocity, pressure, temperature and vapor fraction at the fluid-solid interface. The temperature and the vapor fraction at the liquid-gas interface and the evaporation mass flux are simultaneously determined from the coupled equations for the mass and energy balances at the interface and the thermodynamic relation. The numerical simulation demonstrates the droplet penetration into the porous region and the evaporation to the porous and external flow regions. The effects of external flow velocity, porosity and porous particle size on the droplet deformation and evaporation are investigated.

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