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Numerical simulation of conjugate heat transfer in liquid jet impingement on a moving plate JAEWON LEE, GIHUN SON, Sogang Univ — Numerical simulation is performed for a conjugate heat transfer in liquid jet impingement on a moving hot plate. The associated flow and cooling characteristics, including forced convection and film boiling in the fluid region as well as conduction in the moving solid region, are investigated by solving the conservation equations of mass, momentum, energy, turbulent kinetic energy and dissipation rate in the liquid, gas and solid phases. A vapor film model, which is based on the energy balance between the liquid and vapor phases as well as the fluid and solid phases, is implemented to predict the heat flux at the fluid-solid interface, instead of using the existing model based on the empirical coefficients. The numerical results for various initial conditions of 800C to the Leidenfrost temperature demonstrate that cooling performance and temperature variation of the plate significantly depend on the heat transfer modes of forced convection and film boiling. When a plate is deformed, the local variation of heat flux is influenced by the plate deformation. The effects of jet velocity, jet temperature and plate deformation on the conjugate heat transfer are also investigated.

Jaewon Lee
Sogang Univ

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