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Numerical Study of High-Speed Droplet Impact on Surfaces and its Physical Cleaning Effects TOMOKI KONDO, KEITA ANDO, Keio University — Spurred by the demand for cleaning techniques of low environmental impact, one favors physical cleaning that does not rely on any chemicals. One of the promising candidates is based on water jets that often involve fission into droplet fragments and collide with target surfaces to which contaminant particles (often micron-sized or even smaller) stick. Hydrodynamic force (e.g., shearing and lifting) arising from the droplet impact will play a role to remove the particles, but its detailed mechanism is still unknown. To explore the role of high-speed droplet impact in physical cleaning, we solve compressible Navier-Stokes equations with a finite volume method that is designed to capture both shocks and material interfaces in accurate and robust manners. Water hammer and shear flow accompanied by high-speed droplet impact at a rigid wall is simulated to evaluate lifting force and rotating torque, which are relevant to the application of particle removal. For the simulation, we use the numerical code recently developed by Computational Flow Group lead by Tim Colonius at Caltech. The first author thanks Jomela Meng for her help in handling the code during his stay at Caltech.

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