Numerical Analysis of Puddle Jumping from Hydrophobic Surface A. AVHAD, Washington State University, T. JUBAREE, L. TORRES, M. WEISLOGEL, Portland State University, H. TAN, Washington State University — Drop tower experiments have shown that the liquid puddle can jump from a hydrophobic surface due to absence of gravity. A numerical analysis is carried out to study the puddle jump using an open source computational fluid dynamics code Gerris. The puddle jump of distilled water from both flat base and dished (curved) base hydrophobic surfaces are investigated in our study. The puddle volume varies from 0.03 ml to 100 ml in the previous experimental study. Simulation results including jump velocity, jump time and droplet profile at given times are compared against experiments for validation. The droplet profile, average jump velocity, total energy, jump time and Contact Angle Hysteresis results differ for puddle jump from flat base and dished base. The reason for such difference has been discussed in the study. The energy budget and dissipation mechanisms are studied for some cases. Viscous dissipation has been found to play an important role in jump dynamics, especially before the drop takes-off from surface. The dominating individual viscous dissipation term is different for drop jumping off from flat base and dished base. Furthermore, we also investigate the smallest droplet that can jump off from the surface.

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