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Impact of immiscible drop onto a pool: jetting and sound generation[1] ZIQIANG YANG, SIGURDUR T. THORODDSEN, King Abdullah University of Science and Technology — We use high-speed video imaging to study the impact of a perfluorohexane drop on a water pool, with focus on bubble entrapment and fine vertical jetting during the crater collapse. The drop stretches out at the bottom of the crater, before collapsing during its rebound, often entrapping a small bubble inside the drop liquid, or shooting out a fine vertical jet. The entrapment regimes are mapped in the Weber-Froude number space. The size of entrapped bubble scales with impact Weber number. We observe a sequence of critical conditions for the formation of fine jets, which emerge at velocities up to 32 m/s and jet thickness of a few microns, which break up into as many as 50 micro-droplets. The fastest jets, at 45 m/s, occur for a novel multi-dimple crater shape without bubble pinch-off. We also investigate the sound production from the bubble oscillations following their pinch-off. By synchronizing hydrophones with the high-speed imaging, we connect the phase of the bubble oscillation with the acoustic signal. We find good agreement with the Minnaert frequency when using the fluid properties of the drop. This applies reasonably well even for very small bubbles where the frequency approaches 100 kHz.

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