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Power-Law Transition of Drop-impact Crater Collapse[1] YUANSI TIAN, ZIQIANG YANG, SIGURDUR THORODDSEN, King Abdullah Univ of Sci Tech (KAUST) — The collapse of immiscible drop-impact craters is studied with two simultaneous ultra-high-speed video cameras. Similar to previous same-liquid impacts[1], fastest jets emerge from a dimple at the bottom of the crater which contracts without bubble pinch-off. Different from the capillary-inertial collapse of a drop, where the neck radius scales as $R\tilde{}t^{2/3}$, the pure inertial collapse follows a power law of $R\tilde{}t^{1/2}$, where we find an exponent ˜0.55 which is explained by a slow logarithmic approach[2]. For the pinch-off case, we discover a power-law transition from capillary-inertial to inertial when approaching the singularity for both immiscible and miscible liquid impacts, with a cross-over time ˜100 μs before the pinch-off. The capillary-inertial part has a prefactor $C = R/(\sigma t^2/\rho)^{1/3}$ =1.75±0.2 based on pool properties, while the prefactor for inertial collapse, $C_{\mathrm{inertia}} = R/(DUt)^{0.5}$ =0.30±0.04, is found. Capillary waves are found to mold the air-dimple into different collapse shapes, such as bamboo and telescopic forms. The finest jets are only 12 μm in diameter and the normalized jetting speeds are up to one order of magnitude larger than for jets from bursting bubbles. The singular jets show the earliest cross-over into the inertial regime. The fastest jets can pinch off a toroidal micro-bubble from the cusp at the jet base. 1. Thoroddsen *et al.*, *J. Fluid Mech.*, **848**,R3 (2018). 2. Eggers *et al.*, *Phys. Rev. Lett.*, **98**, 094502 (2007). 3. Yang *et al.*, Submitted to *J. Fluid Mech.* (2020).

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