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Experimental investigation of particle-laden under-expanded jets[1] TAEHOON KIM, RUI NI, Johns Hopkins University, JESSE CAPECELATRO, YUAN YAO, GREGORY SHALLCROSS, University of Michigan, MANISH MEHTA, NASA Marshall Space Flight Center, JASON RABINOVITCH, NASA Jet Propulsion Laboratory — We present an experimental investigation of particle dynamics in sonic under-expanded jets. In this study, the mass loading and particle slip velocity are independently controlled by using a particle injector and a particle accelerator, which are integrated together in a hopper-style particle feeding system. An ultra-high-speed Schlieren imaging and a particle tracking system operating at 2-5 million fps were employed to acquire the dynamics of both the gas phase and particle phase. Statistics for both particle-free and particle-laden under-expanded jets in the near field will be discussed. These new results will provide a rich dataset for expanding our knowledge in compressible multiphase flow problems as well as validating models and simulations in this regime.

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