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Laser imaging measurements of flow dynamics and mixing in gel-phase flows LESTER K. SU, JASON P. LEGGETT, Johns Hopkins University, MILLICENT A. COIL, Orbital Technologies Corp — Gelled hypergolic propellants are interesting in rocket propulsion applications, in combining the stability of solid propellants and the controllability of liquid propellants. To exploit these advantages fully, we require an improved understanding of the flow and mixing properties of gel-phase fluids. In this work, we apply planar laser-induced fluorescence (PLIF) to investigate gel mixing in a mixing layer geometry, and particle image velocimetry (PIV) to measure flow velocities in and around two impinging gel streams. We consider both water-based gels (Ultrez 10) and mineral-oil based gels (Kraton G1650) of varying compositions (strengths). For the PLIF, these gels are doped with disodium fluorescein dye. We will discuss some of the issues attendant to the application of these laser diagnostic methods in the gel phase, and we will illustrate how these gel-phase flows differ from flows of Newtonian fluids in similar flow geometries.

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