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Supercritical fluid mixing in Diesel Engine Applications[1] LUIS BRAVO, U.S. Army Research Laboratory, PETER MA, Stanford University, MATTHEW KURMAN, MICHAEL TESS, U.S. Army Research Laboratory, MATTHIAS IHME, Stanford University, CHOL-BUM KWEON, U.S. Army Research Laboratory — A numerical framework for simulating supercritical fluids mixing with large density ratios is presented in the context of diesel sprays. Accurate modeling of real fluid effects on the fuel air mixture formation process is critical in characterizing engine combustion. Recent work (Dahms, 2013) has suggested that liquid fuel enters the chamber in a transcritical state and rapidly evolves to supercritical regime where the interface transitions from a distinct liquid/gas interface into a continuous turbulent mixing layer. In this work, the Peng Robinson EoS is invoked as the real fluid model due to an acceptable compromise between accuracy and computational tractability. Measurements at supercritical conditions are reported from the Constant Pressure Flow (CPF) chamber facility at the Army Research Laboratory. Mie and Schlieren optical spray diagnostics are utilized to provide time resolved liquid and vapor penetration length measurement. The quantitative comparison presented is discussed.

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