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Investigation of a piezoelectric droplet delivery method for fuel injection and physical property evaluation WEI ZHAO, SHYAM MENON, co-author — A piezoelectric droplet generator is investigated to deliver liquid hydrocarbon fuels to a micro-combustor application. Besides fuel delivery, the setup is intended to measure fuel physical properties such as viscosity and surface tension. These properties are highly relevant to spray generation in internal combustion engines. Accordingly, a drop-on-demand piezoelectric dispenser is used to generate fuel droplet trains, which are studied using imaging and Phase Doppler Particle Anemometry (PDPA). The diagnostics provide information regarding droplet size and velocity and their evolution over time. The measurements are correlated with results from one-dimensional (1D) models that incorporate sub-models for piezoelectric actuation and droplet vaporization. By validating the 1D models for fuels with known physical properties, a technique is developed that has the capability to meter low-vapor pressure liquid fuels to the microcombustor and use information from the droplet train to calculate physical properties of novel fuels.

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