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Abstract for 42nd AIAA Aerospace Sciences Meeting

Detonations of Liquid Oxygen Sprays in Gaseous Hydrogen for Pulse Detonation Rockets

Edward B. Coy
Jonathan M. Watts

Air Force Research Laboratory
Edwards AFB, CA

Detonations of flowing mixtures of cryogenic gaseous hydrogen and liquid oxygen at mixture densities of 3-6 Kg/m³ and varying liquid oxygen fractions have been studied. Wave speeds, pressures, and the time required to effect detonation-to-deflagration transition are reported. Data taken at cryogenic conditions are compared with data taken at equal initial densities and equivalence ratios, but at ambient temperature, as well as with equilibrium, Chapman-Jouget calculations. This work has been undertaken to support development of pulse detonation rocket engines. These results will be directly applicable to the development of the next generation of repetitively pulsed, multi-tube test articles and will also be used to qualify computational models under development for use in system application studies.