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Schlieren image velocimetry measurements in a rocket engine exhaust plume RUDY MORALES, JULIO PEGUERO, MICHAEL HARGATHER, New Mexico Tech — Schlieren image velocimetry (SIV) measures velocity fields by tracking the motion of naturally-occurring turbulent flow features in a compressible flow. Here the technique is applied to measuring the exhaust velocity profile of a liquid rocket engine. The SIV measurements presented include discussion of visibility of structures, image pre-processing for structure visibility, and ability to process resulting images using commercial particle image velocimetry (PIV) codes. The small-scale liquid bipropellant rocket engine operates on nitrous oxide and ethanol as propellants. Predictions of the exhaust velocity are obtained through NASA CEA calculations and simple compressible flow relationships, which are compared against the measured SIV profiles. Analysis of shear layer turbulence along the exhaust plume edge is also presented.

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