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Rubidium Atomic Line Filtered (RALF) Doppler Velocimetry MARIO FAJARDO, CHRISTOPHER MOLEK, ANNAMARIA VESELY, AFRL/RWME — We report the successful proof-of-concept demonstration of the Rubidium Atomic Line Filtered (RALF) Doppler velocimetry technique. RALF is a high-velocity and high-acceleration adaptation of the Global Doppler Velocimetry (GDV) method developed in the 1990s by aerodynamics researchers [H. Komine, U.S. Patent #4919536]. Laser velocimetry techniques in common use within the shock physics community (*e.g.* VISAR, Fabry-Perot, PDV) decode the Doppler shift of light reflected from a moving surface *via* interference phenomena. In contrast, RALF employs a completely different physical principle: the frequency-dependent near-resonant optical transmission of a Rb/N_2 gas cell, to convert the Doppler shift of reflected $\lambda_0 \approx 780.24$ nm light directly into transmitted light intensity. The single-point RALF apparatus used in these experiments is fiber optic based, and incorporates a simultaneous PDV measurement channel as an "internal standard" for validation of the RALF results. Future plans include "line-RALF" experiments with streak camera detection, and two-dimensional surface velocity mapping using pulsed laser illumination and gated intensified CCD camera detection. [RW PA#4931]

Mario Fajardo
AFRL/RWME

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