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Time-Resolved Laser-Induced Fluorescence Measurements of Ion Velocity Distribution in the Plume of a 6 kW Hall Thruster with Unperturbed Discharge Oscillations CHRISTOPHER DUROT, ALEC GALLIMORE, University of Michigan — We present laser-induced fluorescence (LIF) measurements of the time-resolved ion velocity distribution in the plume of a 6 kW laboratory Hall thruster. To our knowledge, these are the first measurements of time-resolved ion velocity distribution on completely unperturbed Hall thruster operating conditions. To date, time-resolved LIF measurements have been made on Hall thrusters with oscillations driven or perturbed to be amenable to averaging techniques that assume a periodic oscillation. Natural Hall thruster breathing and spoke oscillations, however, are not periodic due to chaotic variations in amplitude and frequency. Although the system averages over many periods of nonperiodic oscillation, it recovers the time-resolved signal in part by assuming that a constant transfer function exists relating discharge current and LIF signal and averaging over the transfer function itself (http://dx.doi.org/10.1063/1.4856635). The assumption of a constant transfer function has been validated for a Hall thruster and the technique is now applied to a Hall thruster for the first time.

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