Measurement of XeI and XeII velocity in the near exit plane of a low-power Hall effect thruster by light induced fluorescence spectroscopy

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Near exit plane non-resonant light induced fluorescence spectroscopy is performed in a Hall effect low-power Xenon thruster at discharge voltage of 250 V and anode flow rate of 0.7 mg/s. Measurements of the axial and radial velocity components are performed, exciting the 6s2[3/2]2 → 6p2[3/2]2 transition at 823.16 nm in XeI and the 5d[4]7/2 → 6p[3/2]5/2 transition at 834.724 nm in XeII. No significant deviation from the thermal velocity is observed for XeI. Two most probable ion velocities are registered at a given position with respect to the thruster axis, which are mainly attributed to different areas of creation of ions inside the acceleration channel. The spatial resolution of the set-up is limited by the laser beam size (radius of the order of 0.5 mm) and the fluorescence collection optics, which have a view spot diameter of 8 mm. © 2013 AIP Publishing LLC. [http://dx.doi.org/10.1063/1.4811664]