

Abstract Submitted
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Development of a 2-D Ion Velocity Diagnostic on NSTX Using the SWIFT Camera¹ S. PAUL, R. BELL, PPPL, A. LANE ROQUEMORE, N. NISHINO, Hiroshima U. — Using a beam-splitter and interference filter diagnostic, the development of a 2-D ion flow measurement of toroidal ion flows is being developed on NSTX. A high frame-rate, 12-bit Photron-USA Ltd. monochrome digital camera is used to view He II line emission at 468.6 nm on the inboard side of the plasma in NSTX. The image is split and imaged onto two distinct 64 x 64 pixel sections of the camera's 1024 x 1024 pixel detector. A mirror and the beam-splitter are adjusted so that each of the two sections view the same 30 cm x 30 cm region in the plasma. Each section is made to view through separate interference filters located in the near field. The filters are custom designed and have opposite but linear sloping passbands. In this way the Doppler shift causes the ratio of the light incident on each section of the detector to vary with toroidal velocity. A calibration of the relative gain and linearity of the detector and a wavelength calibration the shape of the passband of the filter, the ion velocity is calculated from the ratio of the intensities from the two images. The light level in helium discharges in NSTX is found to be adequate to make measurements from 250 to 2000 fps. Because the camera was found to be sensitive to magnetic fields, the discharges were taken at a 3 kG field strength, quite low for NSTX. Nevertheless, these helium discharges lasted up to .5 sec and 4 MW of neutral beam heating was injected. Adequate light was obtained for time resolution as short as 0.5 ms and about 500 images were recorded per discharge.

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