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4.42 A Four wavelength multi-spectral imaging system for Alcator C-Mod and TCV

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The Multi-Spectral Imaging system is a new diagnostic that captures simultaneous spectrally filtered images from a common line of sight while maintaining a large étendue. Imaging several atomic line intensities simultaneously may enable numerous measurement techniques. For example, Helium line ratios can produce 2D maps of Te and ne, and Balmer line intensities can be utilized to produce 2D maps of ne and volume recombination. The system uses a polychromator layout where each image is sequentially filtered and focused on to an industrial camera. The polychromator has 96% transmission between spectral channels with minimal vignetting and aberrations. A four-wavelength system was installed on C-Mod and then moved to TCV. The images are absolutely calibrated and spatially registered enabling 2D mappings of atomic line ratios and absolute line intensities. The CIII, and Balmer lines have been used to study detachment in the TCV divertor. The spectral transmissions were calibrated using an incandescent lamp with a known emissivity spectrum. The images are registered by cross-referencing points on TCV with a CAD model, and the images are inverted using the simultaneous algebraic reconstruction technique. This work was supported by USDoE awards DE-FC02-99ER54512 and DE-AC05-06OR23100

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