Abstract Submitted
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Digital Holography for Fast High-Spatial-Resolution Density Measurements[1] C.E. (TOMMY) THOMAS JR., Third Dimension Technologies, L.R. BAYLOR, S.K. COMBS, S.J. MEITNER, D.A. RASMUSSEN, Fusion Energy Division, ORNL — A digital holography demonstration system has been used on the ORNL Disruption Mitigation Test Stand to make extremely high spatial resolution (less than one mm) 2-D density measurements. Although holographic interferometry has long been used as a density diagnostic, this is the first application of digital holography (no plates, no darkroom, no chemicals, no waiting) to high-resolution spatial measurements of density. In the present experiments a CO2 laser and 320 x 256 pixel (∼82,000 pixels) infrared-camera based digital holography system has measured the expansion plume from a fast-valve high-pressure gas injection system similar to the disruption mitigation system presently being tested on DIII-D. The present system is capable of exposures as short as 20 microseconds at 30 frames-per-second (FPS). The experimental design and data from the ORNL Disruption Mitigation Test Stand experiments will be presented, along with discussion of the design and specifications for a second generation system with pulse exposures as short as one microsecond and frame rates as high as 10,000 FPS, proposed for use as a density and fluctuation diagnostic on the LTX experiment at PPPL.

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