Tearing mode structure in the DIII-D tokamak through spectrally-filtered fast visible Bremsstrahlung imaging

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Abstract.

Time evolved measurements of the detailed 2D poloidal structure of rotating tearing modes in the DIII-D tokamak are obtained for the first time using spectrally filtered fast imaging (SFFI) of broadband visible Bremsstrahlung emission (N_B). Measurements are made along 256×256 different sightlines and show excellent agreement with simulations assuming a rotating helical $m/n = 2/1$ island structure superimposed on the equilibrium N_B profile. The method described here is capable of imaging with high resolution the structure of coherent oscillations in the core of current and next-step fusion plasma experiments such as ITER and can be applied to virtually any mode with a finite perturbed N_B and frequency in the laboratory frame provided sufficient signal level and detector bandwidth are available.