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P1.1013 Tangential phase-contrast imaging for fluctuation measurements in JT-60SA: a conceptual study

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See the full abstract here:
http://ocs.ciemat.es/EPS2019ABS/pdf/P1.1013.pdf

This contribution will present a feasibility study and conceptual design of a tangential phasecontrast imaging (PCI) diagnostic for the new JT60SA tokamak. PCI is a well known technique for measuring density fluctuations. Tangential launching, combined with an appropriate spatial filtering technique, affords the measurement highly improved spatial localization, as demonstrated in particular on the TCV tokamak. Tangential ports of 20cm diameter are envisioned to be used on JT60SA, obviating the need to mount steering optics on the vessel, which would be likely to introduce strong mechanical vibrations that would complicate the setup. The tangency point would be at a major radius 1.755 m, which is close to the inner wall; this is less advantageous than a tangency point on the magnetic axis or at midradius, but neither of these options is currently available. Still, a spatial resolution of approximately 10 to 20% of the minor radius can be achieved both in the core and in the pedestal region for k~10 cm^-1, which is near the highwavenumber limit of the ITGTEM spectral region, in both the noninductive highN and the inductive fullpower doublenull scenario. At longer wavelengths, e.g., k~2 cm^-1, the resolution becomes coarser, though it can still approach 20% of the minor radius in the inductive scenario. In the electronscale (ETG) region of the spectrum, the resolution becomes considerably better. The preliminary design presented here will illustrate the possible options regarding spectral access in both frequency and wave number, and will include hardware specifics such as the requirements for neutron and gamma shielding. The presentation will also discuss turbulence simulations with the fluxtube version of the gyrokinetic code GENE that have been performed to assist the design. It is envisioned that, at such time as the diagnostic becomes operational, this modeling machinery will be coupled with a synthetic diagnostic for meaningful theoryexperiment comparison.

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