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Controlling Plasma Rotation using Periodic Gas-puff in ADITYA-U Tokamak

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Plasma rotation and its shear in the edge and scrape-off-layer (SOL) region plays an important role in determining overall confinement of tokamak plasmas. The sources of spontaneous generation of these rotations are still not fully understood. Furthermore, to answer the questions like whether they modify the electric field profile or electric field profile modifies the rotation and its shear, the radial profiles of toroidal and poloidal plasma rotation have been measured in ADITYA-U [1-2] in presence and absence of multiple periodic fuel and neon gas-puffs. Further in typical ADITYA-U discharges, effects of plasma density and different MHD modes on plasma rotation are studied. The results are compared with neo-classical estimations. Plasma rotation velocity is deduced from Doppler shift of the observed line emissions in UV and Visible wavelength range. Carbon spectral emission lines at 229.69, 227.09 and 529.01 nm from C2+, C4+, and C5+, respectively are used to estimate the rotation velocity. The collection optics, installed on a tangential viewport of the tokamak, contains three line-of-sights giving a radial profile of rotation velocity. The Doppler shift of the above spectral lines are measured using a high-resolution 1m f/8.7 Czerny Turner spectrometer equipped with 1800g/mm grating coupled to a fast CCD detector. The details on the development of the diagnostics with an emphasis on the results obtained from ADITYA-U plasma rotation profile will be discussed.

References :
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[2] J Ghosh et al, FIP/P4-46, 26th IAEA Fusion Energy Conference (2016)

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