

Gas Puff Induced Variations of Poloidal Electric Field in Edge Plasma of ADITYA-U Tokamak

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Poloidal electric field (E_θ) emerging from the poloidal asymmetries of floating potential in edge plasma have been observed in several devices and their dependency on plasma parameters like edge safety factor (q_{edge}) has also been found experimentally [1,2]. Although equilibrium poloidal electric field is not considered in neoclassical transport theory, it may arise due to some modification in the orbits of charged particles caused by internal or external mechanisms like change in collisionality of plasma, ECRH, ICRH, and NBI [3, 4, and 5]. Poloidal electric fields thus evolved may also affect transport in tokamak plasma [3].

For this experiment, a poloidal array of Langmuir probes is designed and installed to study the presence of E_θ in ADITYA-U tokamak [6]. The probe is carefully designed to avoid shadowing [7]. In the typical discharges of ADITYA-U with Toroidal magnetic field (B_ϕ) ~ 1 T, poloidal electric field, $E_\theta \sim 1$ -2 kV/m in ion diamagnetic direction at $r = 24.9$ cm has been observed. Interestingly, a significant decrease in the E_θ has been observed after injection of short gas-puff pulse as shown in figure 1.

Toroidal magnetic field (B_ϕ) has also been varied to study the effect of B_ϕ on E_θ .

In this paper the variation of E_θ with gas puff injection will be discussed and how this variation depends on the quantity of the injected gas molecules will be addressed. A systematic study regarding the variations of poloidal asymmetries in floating potential with q_{edge} will also be presented along with the details of the probe system used and the analysis carried out.

References:

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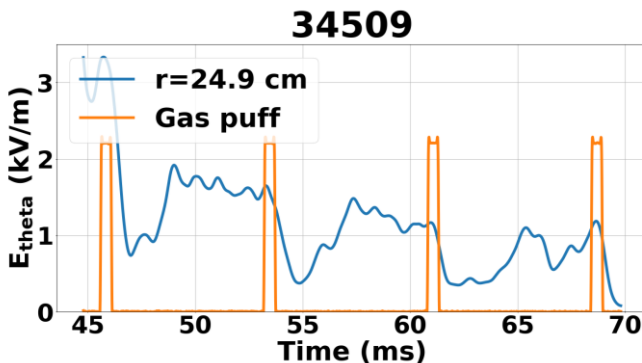


Fig 1. Decrease in E_θ due to gas puff for shot #34509