Topic E	Requested: ☐ Oral ☒ Poster	Panel suggestion: ☐ Oral ☐ Poster

Measurements of Flows in the DIII–D Divertor by Mach Probes*

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The background plasma flows in the divertor region are of the utmost importance to understand particle and heat transport out of the plasma; the particle and heat exhaust being of special concern in an advanced, radiative divertors. Plasma flows are also partially responsible for the transport of impurities generated at the divertor plates to other parts of the discharge and therefor vital to discharge performance.

With the aforementioned motivation in mind, we have performed measurements of flow velocity in the lower divertor in the DIII–D tokamak using Mach pins mounted on a fast scanning probe array. We compare various models for the interpretation of the measurements and validated the underlying assumptions, specially the T_i/T_e ratio.

Data from a double probe located in the same array is used in combination with a Mach pin to provide flow velocity and also to furbish additional, redundant data to verify the Mach measurements. The aditional data obtained from the double probe is also useful as a fail-safe backup in case one of the Mach pins fails, feature of special interest for the fusion community, because the plasma conditions for edge probes are extreme.

Measurements have been performed in DIII–D during upper single-null (USN) and lower single-null (LSN) discharges under a variety of plasma temperature and density conditions, specially during attached and detached divertor conditions. The results for different conditions are compared to each other and to calculations by the UEDGE code. The comparison of attached and detached divertor conditions are of special interest since the physical mechanisms of heat transport to the plates are very different and flows are expected to play a significant role.

We have also documented the temperature, density and Mach number at the private flux region of the divertor and the vicinity of the X–point, which are transition regions and therefore of special interest for many theoriticians.

*Work supported by U.S. Department of Energy under Grant No. DE-FG03-95ER54294, and Contracts DE-AC04-94AL85000 and W-7405-ENG-48.

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