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A Baffled-Probe Technique for Real-Time Edge Diagnostics
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— A baffled probe offers the advantages of direct measurements of the plasma fluid observables, while being non-emitting and electrically floating [1]. The principle of operation of the probe is based on the dependence of the voltage drop in the plasma-probe sheath on the direction of the local magnetic field. When the magnetic field is parallel to the probe surface, the electron-repelling sheath can be significantly reduced as the magnetic field also impedes the cross-field electron flow and therefore, a smaller sheath voltage is needed to maintain the zero current balance to the floating probe. As a result, the accuracy of direct measurement of the plasma potential is greatly increased by eliminating the contribution of electron temperature to the floating-potential measurement. The baffled-probe designs proposed for edge diagnostics will increase the capability to characterize separately plasma properties in real-time for understanding of underlying physics in the edge plasma of tokamaks.

[1] V. I. Demidov et al., Rev. Sci. Instrum. 73, 3409 (2002).

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