

FEASIBILITY STUDIES OF A CHARGE EXCHANGE RECOMBINATION DIAGNOSTIC FOR MEASUREMENT OF IMPURITY FLOWS IN THE DIVERTOR OF THE DIII-D TOKAMAK

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Abstract

Charge exchange recombination, a well-established technique for measuring impurity flows and ion temperature in the core of tokamak plasmas, was evaluated for measuring the same plasma parameters in the divertor region of the DIII-D tokamak. Because divertor temperatures are typically much lower than those in the core, different charge exchange reaction processes must be considered. A combination of experimental measurements and code modeling were carried out to quantify the expected signal-to-background ratio. In conclusion, it was determined that a divertor charge exchange recombination diagnostic is not feasible, even employing lock-in detection methods to extract a beam-modulated signal from background radiation at the same wavelength.