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Category Number and Subject: 5.6.2. DIII-D Tokamak

Theory Experiment

Feasibility Studies of Off-Axis Neutral Beam Current Drive in DIII-D,* M. Murakami, J.M. Park, *ORNL*, T.C. Luce, H.E. St John, M.R. Wade, *GA*, and T.A. Casper, *LLNL* – The objective of off-axis neutral beam (NB) current drive (CD) is to supplement the off-axis electron cyclotron current drive for development of steady state, advanced tokamak scenarios. A modification being considered is to tilt the present neutral beam lines (BL) by raising the source end of the BL by ≈ 1.5 m. The driven current is calculated using the TRANSP and ONETWO/Nubeam Monte-Carlo codes taking into account finite orbit effects. When the beam is injected in the same direction as the toroidal field, a wide but localized off-axis CD (≈ 40 kA/MW at $\rho = 0.5$ with FWHM of 0.45) is calculated. The normalized CD efficiency ($\zeta = 0.22$) is comparable or somewhat better than electron cyclotron current drive. Sensitivities to fast ion diffusion and the use of the off-axis CD for scenarios with high steady-state performance in DIII-D will be discussed.

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