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Category Number and Subject: 5.6.2 DIII-D Tokamak

[ ] Theory [x] Experiment

Progress Toward High Beta, Steady-State Conditions in DIII-D,*

C.M. Greenfield and the DIII-D Advanced Scenario Thrust Group, *GA* – Advanced Tokamak research in DIII-D seeks to provide a scientific basis for steady-state high performance operation in future fusion devices. Recent work on DIII-D concentrates on scenarios with weakly reversed magnetic shear, minimum safety factor q_{min} between 1.5 and 2, beta above the no-wall limit and current driven by bootstrap, central neutral beam current drive (NBCD) and off-axis electron cyclotron current drive (ECCD). In this regime, 100% net noninductive conditions were previously reported with confinement somewhat reduced from the best achieved, thereby allowing increased NBCD near the axis. In these plasmas, the central NBCD is too large, necessitating a small but finite negative Ohmic current which is balanced by a positive Ohmic current at larger radius. With optimized confinement, NBCD is too small with NBI power limited to maintain beta below stability limits. We will report studies where smaller degradations to confinement are expected to allow us to adjust the NBI power at fixed beta for improved alignment. We will also report on studies of variations of this scenario with higher q_{min}, with stronger negative shear ("current hole") and with flat q profiles.

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