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Category Number and Subject: 6.15 MHD, 6.20 DIII-D Tokamak

Theory Experiment Combined/General

Observing the Coupling of the Toroidal Plasma Rotation Due to $m/n=2/1$ and $m/n=3/2$ Neoclassical Tearing Modes by Uncorrected $n=2$ Error Field in DIII-D,* M. Okabayashi, B.J. Tobias, *PPPL*; E.J. Strait, R.J. La Haye, *GA*; C. Paz-Soldan, *ORISE*; D. Shiraki, *ORNL*; J.M. Hanson, *Columbia U* – Injection of electromagnetic torque by tearing mode rotation control feedback can sustain rotation of the $2/1$ NTM, avoiding mode locking for several seconds after the mode appearance. This feedback process optimizes the phasing of rotating applied $n=1$ field relative to the mode, hence preventing the locking and simultaneously compensating the $n=1$ error field (EF). In high beta discharges, the large amplitude sustained $2/1$ NTM reduces the local toroidal rotation to near zero at the $q=3/2$ surface and $=1$, implying the angular momentum is coupled between the two rational surfaces. The mode at the $q=3/2$ surface is identified as a $m/n=3/2$. The mode is presumably affected by $n=2$ EF as well as remaining uncorrected $n=1$ EF. A possible process of sustained NTM with velocity shear due to the E_r buildup by large size magnetic islands will also be discussed.

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