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Design, Simulation, and Operational Use of Control Algorithms for ECCD Suppression of the $m/n=3/2$ Neoclassical Tearing Mode¹ D.A. HUMPHREYS, R.J. LA HAYE, B.G. PENAFLO, M.L. WALKER, General Atomics — The $3/2$ neoclassical tearing mode (NTM) imposes significant limits on achievable values of normalized plasma beta.² Suppression of this mode has been achieved in various tokamaks by preprogrammed application of electron cyclotron current drive (ECCD) fixed at (or swept across) the $3/2$ island location to replace lost bootstrap current.³ We report on the design and development of realtime plasma control algorithms for suppression of the $3/2$ NTM by varying the ECCD/island alignment through modification of the toroidal field or plasma major radius. Alignment is detected solely through measurement and analysis of mode amplitude evolution. These nonlinear “search and suppress” algorithms were designed and developed using computational simulations of modal dynamic response, and were used successfully to completely suppress the $3/2$ NTM in the DIII-D tokamak.⁴

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²R.J. La Haye, et al., Nucl. Fusion **37**, 397 (1997).

³H. Zohm, et al., Phys. Plasmas **8**, 2009 (2001).

⁴R.J. La Haye, et al., this conference.

Prefer Oral Session

Prefer Poster Session

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