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Simulation of suppression of neoclassical tearing modes with ECCD J. PRATT, E. WESTERHOF, FOM Institute DIFFER - Dutch Institute for Fundamental Energy Research, Association EURATOM-FOM, Trilateral Euregio Cluster, the Netherlands — Above a critical value of the plasma beta, neoclassical tearing modes (NTMs) destabilize, reducing confinement and causing disruptions. The primary tactic for controlling NTMs in ITER is to apply localized electron cyclotron current drive (ECCD) inside the magnetic islands. Theoretical description of the evolution of nonlinear, resistive magnetic islands is currently based on the generalized Rutherford equation (GRE), obtained by averaging Ohm's law for the perturbed helical current over the entire island region. In order to study the stabilization processes inside an island in more detail than the GRE allows, we extend the nonlinear 3D reduced-MHD simulation JOREK [1-2] to include ECCD effects. With the extended simulation, we investigate detailed evolution of the inside of magnetic islands during their stabilization by ECCD. We discuss implications of our results for the GRE.

[1] G. T. A. Huysmans, S. Pamela, E. van der Plas, and P. Ramet, Plasma Physics and Controlled Fusion 51, 124012 (2009).
[2] M. Hölzl, S. Günter, R. P. Wenninger, W.-C. Müller, G. Huysmans, K. Lackner, I. Krebs, and ASDEX Upgrade Team, arXiv:1201.5765v2 (2012).

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