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Optimized Generation of Helical Current in a NTM by Modulated ECCD in ASDEX Upgrade M. MARASCHEK, MPI for Plasmaphysics, G. GANTENBEIN, Forschungszentrum Karlsruhe, Q. YU, H. ZOHM, S. GUENTER, F. LEUTERER, A. MANINI, L. URSO, ASDEX UPGRADE TEAM — The control of MHD instabilities is of great interest to expand operational space and hence the performance of present day and future tokamaks, such as ITER. Electron Cyclotron Current Drive (ECCD) with its highly flexible, localised deposition is an ideal tool for this purpose. Experiments with optimised deposition, maximising $\eta_N TM = j_E CCD/j_b s$ have been continued for NTM stabilization. They verify the relevance of this figure of merit, which has been adopted by ITER for the NTM stabilization and have increased the β_N range in which NTMs can be stabilized. Another crucial point for ITER is the requirement of phased injection in the island's O-point. Experiments on (3,2) NTM stabilization with an broadened deposition mimic the situation in ITER (marginal island size $<$ the deposition width in the final stabilization). The experiments show an advantage of the modulated ECCD and are accompanied by modelling using a fully nonlinear resistive MHD code. An analysis of NTM stabilization based on the modified Rutherford equation has been carried out to obtain fit coefficients for predictions for ITER. We will discuss the next steps undertaken on ASDEX Upgrade to verify feedback controlled MHD mode control. A central part of this is the on-line determination of both mode position and ECCD deposition and its use to poloidally steer the mirrors.

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