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Neoclassical Tearing Mode Locking Avoidance by 3D Fields and Recovery of High Confinement[1] M OKABAYASHI, B BUDNY, D BRENNAN, N FERRARO, B GRIERSON, S JARDIN, N LOGAN, R NAZIKIAN, B TOBIAS, Z WANG, PPPL, E STRAIT, J DE GRASSIE, R LA HAYE, C PAZ-SOLDAN, Z TAYLOR, GA, D SHIRAKI, ORNL, J HANSON, GA, C HOLCOMB, LLNL, Y LIU, CCFE — A slowly rotating n=1 helical magnetic field has been applied for Neoclassical Tearing Mode (NTM) locking avoidance in the DIII-D tokamak. This 3D field applied through feedback recovered a high performance configuration by rebuilding a H-mode edge and high ion temperature internal transport barrier in the plasma core, although, at present, the β_n was reduced by 30%. The m/n=2/1 component of 3D field served to avoid NTM locking, while the m/n=1 and the m/n=(4-5)/1 components recover core confinement and H-mode edge. Preliminary analysis shows a quasi-steady helical plasma flow was built up around the core, mostly parallel to the equilibrium magnetic field. The optimization of m-components with n=1 is a promising approach for integrating optimizations of MHD stability from core to edge.

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