Research in support of ITER

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Energy Confinement Recovery in Low Collisionality ITER Shape Plasmas with Applied Resonant Magnetic Perturbations (RMPs)[1] L. CUI, B. GRIERSON, N. LOGAN, R. NAZIKIAN, Princeton University — Application of RMPs to low collisionality ($\nu *_e$ <0.4) ITER shape plasmas on DIII-D leads to a rapid reduction in stored energy due to density pumpout that is sometimes followed by a gradual recovery in the plasma stored energy. Understanding this confinement recovery is essential to optimize the confinement of RMP plasmas in present and future devices such as ITER. Transport modeling using TRANSP+TGLF indicates that the core a/LTi is stiff in these plasmas while the ion temperature gradient is much less stiff in the pedestal region. The reduction in the edge density during pumpout leads to an increase in the core ion temperature predicted by TGLF based on experimental data. This is correlated to the increase in the normalized ion heat flux. Transport stiffness in the core combined with an increase in the edge a/LTi results in an increase of the plasma stored energy, consistent with experimental observations. For plasmas where the edge density is controlled using deuterium gas puffs, the effect of the RMP on ion thermal confinement is significantly reduced.

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