Comparison of External and Internal Transport Barriers in Drift Wave Predictive Simulations

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Abstract

At the ITPA meeting in Culham 2010 and at the EPS conference 2010[1] we reported a self consistent predictive simulation of four channels in the formation of an Internal Transport Barrier (ITB) in JET69454. An important feature was the spinup of poloidal momentum at the location of the barrier with the experimental magnitude. Simulations have now been made with the same code for the edge barrier in the same shot. The outer boundary of Ti has however been varied freely at a level expected to be of the order of the temperature at the foot of the barrier. Since this value has been taken as a free parameter we do not expect quantitative agreement with JET69454. These simulations were mainly done in order to see if a mechanism for the edge barrier (ETB) is present in the model . Barriers were obtained with pedestal temperatures around 2.5 KeV for edge temperatures of a few hundred eV. Interesting similarities between the ETB and ITB was that both require nonlocal effects to be formed and both are sensitive to finite beta. Then both are also associated with a strong spinup of poloidal rotation. The model includes the transition from drift waves to resistive ballooning modes discussed in Ref 2. The model also contains kinetric ballooning modes as found important in Ref 3 and the varying correlation length from Ref 4 which actually seems to give relevant modenumbers in the edge. Beta scans are underway and will be presented at the workshop.

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3. P.B.Snyder, RJ. Groebner, A.W. Leonard, T.H. Osborne and H.R. Wilson, Phys. Plasmas **16**, 056118 (2009).
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*See the Appendix of F. Romanelli et al., Proceedings of the 23nd IAEA Fusion Energy Conference 2010, Daejeon, Korea.