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Transport and Stability in C-Mod ITBs in Diverse Regimes[1]
C.L. FIORE, D.R. ERNST, N.T. HOWARD, C.P. KASTEN, MIT-PSFC, D. MIKKELSEN, PPPL, M.L. REINKE, J.E. RICE, A.E. WHITE, MIT-PSFC, W.L. ROWAN, I. BESPAMYATNOV, IFS-UTA — Internal Transport Barriers (ITBs) in C-Mod feature highly peaked density and pressure profiles and are typically induced by the introduction of radio frequency power in the ion cyclotron range of frequencies (ICRF) with the second harmonic of the resonance for minority hydrogen ions positioned off-axis at the plasma half radius on either the low or high field side of the plasma. These ITBs are formed in the absence of particle or momentum injection, and with monotonic q profiles with $q_{min} < 1$. Thus they allow exploration of ITB dynamics in a reactor relevant regime. Recently, linear and non-linear gyrokinetic simulations have demonstrated that changes in the ion temperature and plasma rotation profiles, coincident with the application of off-axis ICRF heating, contribute to greater stability to ion temperature gradient driven fluctuation in the plasma. This results in reduced turbulent driven outgoing heat flux. To date, ITB formation in C-Mod has only been observed in EDA H-mode plasmas with moderate (2-3 MW) ICRF power. Experiments to explore the formation of ITBs in other operating regimes such as I-mode and also with high ICRF power are being undertaken to understand further the process of ITB formation and sustainment, especially with regard to turbulent driven transport.

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