Contribution ID: **449** Type: **Poster**

EX/P3-28: Production of Internal Transport Barriers by Intrinsic Flow Drive in Alcator C-Mod

Wednesday, 10 October 2012 08:30 (4 hours)

New results suggest that changes observed in the intrinsic toroidal rotation influence the internal transport barrier (ITB) formation in the Alcator C-Mod tokamak. Detailed plasma rotation and ion temperature profile measurements are combined with linear and non-linear gyrokinetic simulation to examine the effects of the self-generated rotational shear on the transport changes that occur in C-Mod ITB plasmas. These arise when the resonance for ICRF minority heating is positioned off-axis at or outside of the plasma half-radius. These ITBs form in a reactor relevant regime, without particle or momentum injection, with T_i≈T_e, and with monotonic q profiles (q_min < 1). C-Mod H-mode plasmas exhibit strong intrinsic co-current rotation that increases with increasing stored energy without external drive. When the resonance position is moved off-axis, the rotation decreases in the center of the plasma resulting in a radial toroidal rotation profile with a central well which deepens and moves farther off-axis when the ICRF resonance location reaches the plasma half-radius. This profile results in strong E×B shear (>1.5x10ˆ5 Rad/sec) in the region where the ITB foot is observed. Gyrokinetic analyses indicate that this spontaneous shearing rate is comparable to the linear ion temperature gradient (ITG) growth rate at the ITB location and is sufficient to reduce the turbulent particle and energy transport. The newly available detailed measurement of the ion temperature demonstrates that the radial profile flattens as the ICRF resonance position moves off axis, decreasing the drive for ITG the instability as well. These results are the first evidence that intrinsic rotation can affect confinement in ITB plasmas, and suggest that this regime could be achievable in ITER and in future reactor experiments.

Country or International Organization of Primary Author

United States of America

Primary author: Ms FIORE, Catherine (USA)

Co-authors: Dr MIKKELSEN, D. (PPPL); Dr ERNST, D. R. (MIT-PSFC); Dr BESPAMYATNOV, I. (IFS, U of Texas at Austin); Dr RICE, J. E. (MIT- PSFC); Mr LEE, J. (MIT-PSFC); Dr HUGHES, J. W. (MIT-PSFC); Dr REINKE, M. L. (MIT-PSFC); Mr HOWARD, N. T. (MIT-PSFC); Dr ROWAN, W. L. (IFS, U of Texas at Austin); Mr MA, Yungxing (MIT-PSFC); Mr PODPALY, Yuri (MIT-PSFC)

Presenter: Ms FIORE, Catherine (USA)

Session Classification: Poster: P3

Track Classification: EXC - Magnetic Confinement Experiments: Confinement