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Differential Heating to Control the Cross-phase: A Mechanism for Controlling I-modes and Other Enhanced Confinement Regimes?[1]
DAVID NEWMAN, University of Alaska Fairbanks, P TERRY, Univ. of Wisconsin , R SANCHEZ, Univ. Carlos III de Madrid, D ROGERS, S PANTA, University of Alaska Fairbanks — The I-mode and similar new transport regimes offer good confinement properties with reduced density limit issues and better control. While a number of different mechanisms have been identified for the formation and maintenance of enhanced confinement regimes few if any allow enhanced confinement in one channel but not another which is seen in the I-mode. We propose differential cross-phase modification as a possible mechanism for different transport in different channels and investigate control tools. Simple dynamical models have been able to capture a remarkable amount of the dynamics of the core and edge transport barriers found in many devices. By including in this rich though simple dynamic transport model a simple model for cross phase effects, due to multiple instabilities, between the transported fields such as density and temperature, we can investigate whether the dynamics of more continuous transitions such as the I-mode can be captured and understood. If this mechanism is valid, what can the model tell us about control knobs for these promising regimes? Can we use differential electron and ion heating to control the I-mode regime going both into and out?

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