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Global Surrogates for the Upshift of the Critical Threshold in the Gradient for ITG Driven Turbulence[1] CRAIG MICHOSKI, University of Texas at Austin, SALOMON JANHUNEN, University of Saskatchewan, DANIAL FAGHIHI, University of Texas at Austin, VARIS CAREY, University of Colorado at Denver, ROBERT MOSER, University of Texas at Austin — The suppression of micro-turbulence and ultimately the inhibition of large-scale instabilities observed in tokamak plasmas is partially characterized by the onset of a global stationary state. This stationary attractor corresponds experimentally to a state of "marginal stability" in the plasma. The critical threshold that characterizes the onset in the nonlinear regime is observed both experimentally and numerically to exhibit an upshift relative to the linear theory. That is, the onset in the stationary state is upshifted from those predicted by the linear theory as a function of the ion temperature gradient R_0/L_T. Because the transition to this state with enhanced transport and therefore reduced confinement times is inaccessible to the linear theory, strategies for developing nonlinear reduced physics models to predict the upshift have been ongoing. As a complement to these effort, the principle aim of this work is to establish low-fidelity surrogate models that can be used to predict instability driven loss of confinement using training data from high-fidelity models.

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