Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Likelihood of Alfvnic instability bifurcation in experiments VINICIUS DUARTE, NIKOLAI GORELENKOV, MIRJAM SCHNELLER, ERIC FREDRICKSON, Princeton Plasma Physics Laboratory, HERBERT BERK, University of Texas, Austin , GUSTAVO CANAL, General Atomics, WILLIAM HEIDBRINK, University of California, Irvine, STANLEY KAYE, MARIO PODESTA, Princeton Plasma Physics Laboratory, MICHAEL VAN ZEELAND, General Atomics, WEIXING WANG, Princeton Plasma Physics Laboratory — We apply a criterion for the likely nature of fast ion redistribution in tokamaks to be in the convective or diffusive nonlinear regimes. The criterion, which is shown to be rather sensitive to the relative strength of collisional or micro-turbulent scattering and drag processes, ultimately translates into a condition for the applicability of reduced quasilinear modeling for realistic tokamak eigenmodes scenarios. The criterion is tested and validated against different machines, where the chirping mode behavior is shown to be in accord with the model. It has been found that the anomalous fast ion transport is a likely mediator of the bifurcation between the fixed-frequency mode behavior and rapid chirping in tokamaks. In addition, micro-turbulence appears to resolve the disparity with respect to the ubiquitous chirping observation in spherical tokamaks and its rarer occurrence in conventional tokamaks. In NSTX, the tendency for chirping is further studied in terms of the beam beta and the plasma rotation shear. For more accurate quantitativeassessment, numerical simulations of the effects of electrostatic ion temperature gradient turbulence on chirping are presently beingpursued using the GTS code.

Vinicius Duarte
Princeton Plasma Physics Laboratory

Date submitted: 13 Jul 2017 Electronic form version 1.4