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**Axisymmetric Phase Space Structures Driven by Fast Ions in JET**

H.L. BERK, Institute for Fusion Studies, Austin, TX, C.J. BOSWELL, MIT-PSFC, S.E. SHARAPOV, Euratom/UKAEA Fusion Association, UK, T. JOHNSON, Euratom/VR Fusion Association, Sweden, M.F.F. NAVE, Euratom/IST Fusion Association, Portugal, S.D. PINCHES, Euratom/IPP Fusion Association, Germany — Theoretical analysis shows that frequency sweeping of kinetically driven instabilities, near marginal stability, may arise due to the spontaneous formation of phase-space structures.<sup>1</sup> The JET observation of axisymmetric ( $n=0$ ) frequency sweeping modes induced by energetic particles (produced by high-field side off-axis ICRH) is indicative of the formation of such structures. A consistent explanation attributes the linear mode excitation to the geodesic acoustic mode which requires  $n=0$  for mode existence. The SELFO Monte Carlo code shows that the fast ion distribution has a region in phase space where  $\partial F/\partial E > 0$  with high field side ICRH and that the trapped particle bounce frequencies are found to coincide with the range of the chirped frequency span. Additional ion heating by tangential neutral beams makes the energetic particle distribution more isotropic, removing the instability drive and causing the quench of the mode. The understanding of the linear and nonlinear characteristics of the axisymmetric phase space structures gives a good example of plasma-wave interactions.

<sup>1</sup>Berk H. L., *et al.* Phys. Plasmas 6 3102 (1999)

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