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L-H transition physics and energetics of zonal flows in the H-1 heliac MICHAEL SHATS, HUA XIA, The Australian National University — Finite frequency zonal flows, or geodesic acoustic modes observed in the H-1 heliac [1], play an important role in plasma dynamics during spontaneous L-H transitions [2]. Here we describe detailed dynamics of the turbulence spectra as plasma approaches the bifurcation from L to H mode. The inverse energy cascade [3] leads to the accumulation of the turbulence energy in the largest vortex seen as the mean ExB flow, similar to spectral condensation in 2D fluid turbulence [4], until geodesic effects due to the compressibility of the flow lead to the generation of the side-band modes, as shown in numerical simulation [5]. The number of these modes gradually increases towards the L-H transitions. It is speculated that the shear decorrelation mechanism eventually forbids the geodesic conversion of the Er energy into the energy of the side-band modes which reinforces spectral condensation and leads to L-H transition.

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