Coupling between turbulence and flows during the L-H transition

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Abstract
The dynamics of turbulence and plasma flows has been studied experimentally using Doppler reflectometry [1] during edge transport barrier formation and collapse in TJ-II plasmas.

The coupling between turbulence and flows measured during the L-H transition is consistent with L-H transition models based on turbulence induced zonal flows.

Signatures of the spatial spreading of the turbulence are found as the plasma approaches the H-L back-transition.

L-H transition close to the threshold

Pronounced oscillations in both $E_r$ and $\dot{\theta}_r$ are measured right inside the $E_r$-shear layer position but not outside: $E_r$-shear oscillation amplitude $= 200 \text{ kv/m} \approx 2 \times 10^5 \text{ s}^{-1}$

The oscillations appearance and duration depend on the magnetic configuration

Conclusions
L-H transition: the turbulence reduction precedes the increase in the mean sheared flow, but it is simultaneous with the increase in the low frequency oscillating sheared flow [2]

The coupling between fluctuations and flows, described as a predator-prey evolution, is the basis for some L-H transition models [6,7]

References