

## Dynamical response of turbulence during limit-cycle oscillation in JFT-2M Tokamak

### abstract:

In the JFT-2M tokamak, limit-cycle oscillation (LCO) among electrostatic potential, radial electric field, electron density, turbulence intensity, as well as D-alpha emission from divertor region, was observed before L-to-H transition. Heavy Ion Beam Probe (HIBP) clarified spatiotemporal dynamics of the LCO in detail. Modulation in the density gradient and the edge-localized mean poloidal flow, which did not have zonal structure, were observed. Modulation was also seen in the Reynolds stress. However, flow acceleration was not explained by the modulation in the Reynolds stress, considering the dielectric constant of toroidal plasmas. The observation was explained by the electric field bifurcation theory [Itoh et al, Phys. Rev. Lett. 67, 2485-2488 (1991)].

The LCO excited rapid inward propagation in density gradient and turbulence packet. Characteristics of the propagation were verified by means of turbulence spreading theory and diffusion theory. On one hand, the rapid pulse propagation provided extremely large value of diffusivity (factor 10 times larger than the previously evaluated value). On the other hand, the turbulence spreading theory plausibly explained the observation.