The simultaneous measurements of core and outer core fluctuations using CO₂ laser collective scattering diagnostic in the EAST superconducting tokamak

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The H mode is the projected basic operation scenario for the ITER tokamak [1]. The synergistic effect of zonal flow and equilibrium E×B flow shear is believed to be the reason for L-H transition, however, the detailed physical mechanism has not been identified so far [2]. Tangential multi-channel CO₂ laser collective scattering diagnostic system was installed to investigate electron density fluctuations on EAST tokamak. The measurements in a so-called dithering L-H transition show that in core plasma the low-frequency fluctuations strengthen greatly before L-H transition; meanwhile in outer core plasma the low-frequency fluctuations strengthen slightly. Bispectral analysis reveals that in both core and outer core plasma the coupling strength between low-frequency and high-frequency fluctuations strengthen greatly before the transition, but the latter is greater than the former. The results indicate that the low-frequency fluctuations in both core and outer core plasma play active, but different, roles in the L-H transition.