Contribution ID: **585** Type: **Poster**

EX/P4-06: New Edge Localized Modes at Marginal Input Power with Dominant RF-heating and Lithium-wall Conditioning in EAST

Wednesday, 10 October 2012 14:00 (4h 45m)

The EAST tokamak has achieved, for the first time, the ELMy H mode at a confinement improvement factor HITER89-P˜1.7, with dominant RF heating and active wall conditioning by lithium evaporation and real-time injection of Li powder. During the H-mode phase, a new small-ELM regime has been observed with the power threshold of the L-H transition close to the prediction by the international tokamak scaling. The small-ELM regime is manifested as sinusoidal-like oscillations on edge plasma measurements with frequencies ranging from several hundred Hz to 3 kHz, which exhibits an initial growth phase and can last over 1s. In contrast to the usual type-III ELMy regime, both plasma density and stored energy increase almost linearly with time during the small-ELM phase. Heat fluxes at the divertor target plates during the small ELMs are much smaller than those for the type-III ELMs by one order of magnitude. Magnetic measurements show small-amplitude oscillations during the small ELMs with the poloidal mode number m = 1, and the toroidal mode number n = 0.

Detailed measurements from the reciprocating probes near the separatrix reveal that the oscillations on the floating potential and ion saturation current of small ELMs are much smaller than those of type-III ELMs. Further study of the floating potential inside the separatrix shows modulation interactions and strong three-wave coupling between the small ELMs and high-frequency-broadband (80 –500 kHz) turbulences that emerge after the L-H transition or in the inter-ELM phase. The fluctuations of the floating potential at different toroidal, poloidal and radial locations are strongly correlated with each other, with nearly no phase differences poloidally and toroidally, but with finite phase difference radially, thus providing strong evidence for the presence of zonal flows. New observations have also been made on the type-III ELMs. Measurements from Mach probes have demonstrated a decreasing co-current rotation during type-III ELMs. These suggest that the type-III ELMs may transport substantial particles, energy and momentum out of the plasma. Each type-III ELMy crash enhances the radial electric field Er and turbulence driven Reynolds stress. Furthermore, the filament-like structure of type-III ELMs has clearly been identified as multiple peaks on the ion saturation and floating potential measurements.

Country or International Organization of Primary Author

China

Collaboration (if applicable, e.g., International Tokamak Physics Activities)

Denmark,US

Primary author: Mr WANG, Huiqian (Institute of Plasma Physics,Chinese Academy of Sciences)

Co-authors: Prof. WAN, Baonian (Institute of Plasma Physics, Chinese Academy of Sciences); Mr XU, Guosheng (China); Mr XIONG, Hao (Institute of Plasma Physics, Chinese Academy of Sciences); Prof. GUO, Houyang (Institute of Plasma Physics, Chinese Academy of Sciences); Dr WANG, Liang (Institute of Plasma Physics, Chinese Academy of Sciences); Mr SHAO, Linming (Institute of Plasma Physics, Chinese Academy of Sciences); Ms JIANG, Min (Institute of Plasma Physics, Chinese Academy of Sciences); Mr YAN, Ning (Institute of Plasma Physics, Chinese Academy of Sciences); Dr LIU, Peng (Institute of Plasma Physics, Chinese Academy of Sciences); Dr CHEN, Ran (Institute of Plasma Physics, Chinese Academy of Sciences); Dr LIU, Shaocheng (Institute of Plasma Physics, Chinese Academy of Sciences); Dr DING, Siye (Institute of Plasma Physics, Chinese Academy of Sciences); Prof. NAULIN, Volker (Association Euratom-Risø DTU, DK-4000 Roskilde, Denmark); Dr ZHANG, Wei (Institute of Plasma Physics, Chinese Academy of Sciences)

Presenter: Mr XU, Guosheng (China)

Session Classification: Poster: P4

Track Classification: EXC - Magnetic Confinement Experiments: Confinement