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Experimental study of radio-frequency driven spontaneous rotation for high-performance plasmas on EAST

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Rotation driven by radio-frequency waves have been studied on EAST for plasmas heated by LHW, ICRF and ECRH. Understanding of momentum transport characteristics plays an important role in pushing towards RF-heating dominated high-performance plasma operations on EAST. Using newly developed diagnostics, studies on RF-heated plasma rotation and momentum transports have been further carried out. Efficient rotation increment has been observed and its effect on plasma confinement was seen. New observed plasma rotation behaviors in plasmas heated by newly commissioned LHCD and ECRH will be presented and parametric analysis were performed to study the dependence of rotation change on various plasma parameters to further understand the efficient rotation driving mechanisms on EAST. It was found that co-current rotation change increased with injected LHCD power and was closely related with internal inductance and safety factor, i.e. current density profile. Local rotation change induced by ECRH was also observed upon the commissioning of the ECRH system. For ohmic target plasmas, on-axis ECRH heating produced co-current increase in core rotation and elevated Te/Ti ratio, consistent with co-current intrinsic torque with ECRH. Rotation increment upon RF injection was also linearly correlated with plasma beta. Together with ICRF, a combination of various RF schemes provides good capability for efficient rotation drive in support of high-performance operations on EAST.

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Primary author: Dr LYU, Bo (Institute of Plasma Physics, Chinese Academy of Sciences)

Co-authors: Dr WAN, Baonian (Institute of Plasma Physics, Chinese Academy of Sciences); Dr DING, Bojiang (Institute of Plasma Physics, Chinese Academy of Sciences); Dr WANG, Fudi (Insitute of Plasma Physics, CAS); Mr LIU, Fukun (Institute of Plasma Physics, CAS); Dr FU, Jia (Institute of Plasma Physics, CAS); Mr CHEN, Jun (Institute of Plasma Physics, CAS); Dr HILL, Kenneth (Princeton Plasma Physics Laboratory); Dr DELGADO-APARICIO, Luis F. (Princeton Plasma Physics Laboratory); Dr BITTER, Manfred (Princeton University); Mr WANG, Mao (Institute of Plasma Physics, CAS); Dr PABLANT, Novimir (Princeton Plasma Physics Laboratory); Mr HU, Ruiji (University of Science and Technology of China); Dr LEE, Sang Gon (National Fusion Research Institute); Mr YIN, Xianghui (Institute of Plasma Physics, CAS); Dr LI, Yingying (Institute of Plasma Physics); Dr SHI, Yuejiang (Seoul National University)

Presenter: Dr LYU, Bo (Institute of Plasma Physics, Chinese Academy of Sciences)

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