

HTPD 2018



Contribution ID : 21

Type : not specified

10.6 Edge toroidal rotation shear dependence of the H-mode power threshold on EAST tokamak

Wednesday, 18 April 2018 10:30 (90)

Understanding of the influence of the edge toroidal rotation on the L-H transition power threshold is important for improving the plasma performance of future fusion devices. An edge toroidal charge exchange recombination spectroscopy (eCXRS) diagnostic has been deployed recently on the Experimental Advanced Superconducting Tokamak (EAST), providing the edge toroidal rotation. Experimental investigations on EAST show that the L-H transition power threshold depends approximately on the edge toroidal rotation by eCXRS. Generally, the threshold power increases with the increasing edge toroidal rotation for both normal Bt and reversal Bt plasmas. However, this result is not applicable in all cases. A new criterion has been founded that the L-H transition power threshold depends strongly on the edge toroidal rotation shear. L-mode shots and L-H transition shots also have obviously different edge rotation shear in the figure 2. The observed reduction of power threshold with decreasing rotation shear could be explained by the change of edge radial electric field structure, induced by rotation shape. This reduced power threshold at lower toroidal rotation and lower rotation shear could benefit to inherently low-rotation plasma such as ITER and CFETR.

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Session Classification : Session #10, Wednesday Morning Poster Session