



Research on Density Limit in Tokamak

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Discharges of plasmas in tokamak are limited in a range of operational parameters. Even in a handled wall condition and lower impurities level, the serious disruption triggered by density limit has been observed in not only in tokamaks, many devices reproduce the similar phenomenas. Many researches about disruption and density limit show that both density limit and H-L transition is linked with edge physics. Just before disruption happened (0.8~0.9 Greenwald limit), the operation regime will transform to L-mode from the H-mode, which suggests a tight link between regime transition and density limit.

We are at the moment working on the mechanism of L-H transition, during which an I- phase (an oscillation of turbulence intensity, zonal flow and mean flows) can be observed experimentally and numerically. An multi-predator-one-prey model has proposed in 2002 to describe this process, in which a suppression effect on turbulence via zonal flows and mean flows are introduced. An simulation is been dealing with by changing the boundary density condition with a reasonable fueling model within this theoretical framework and the I-phase appears as well, and finally system enter into an steady state due to the decay of turbulence, which means a static H-mode has been achieved.

References

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