

Access to a new plasma edge state with high density and pressures using Quiescent H-mode

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Abstract

A path to a new high performance regime has been discovered in tokamaks that could improve the attractiveness of a fusion reactor. Experiments on DIII-D using a quiescent H-mode edge have navigated a valley of improved edge peeling-ballooning stability that opens up with strong plasma shaping at high density, leading to a doubling of the edge pressure over standard edge localized mode (ELM)ing H-mode at these parameters. The thermal energy confinement time increases both as a result of the increased pedestal height and improvements in the core transport and reduced low- k turbulence. Calculations of the pedestal height and width as a function of density using constraints imposed by peeling-ballooning and kinetic-ballooning theory are in quantitative agreement with the measurements.

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