Topic: EX-C

Pedestal structure and transport in the EP H and VH-modes

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We report on a comparative study of two enhanced confinement regimes: the VH-mode observed at DIII-D, and the NSTX Enhanced Pedestal (EP) H-mode. These regimes are characterized by excellent energy confinement, making them potentially very attractive as operational regimes in future devices if stationary conditions can be achieved. Both the VH and EP H-modes show changes in the edge pedestal structure, with increases in temperature (primarily in the ion channel) and rotation above the equivalent H-mode levels that are qualitatively similar. It has been previously shown that, in the EP H-mode, the ion temperature gradient near the edge strongly correlates with the gradient in the toroidal rotation, with the pedestal ion temperature increasing approximately linearly with rotation shear. A similar trend has been found from analysis of recent VH experiments, with VH-mode discharges showing higher values of both than H-mode discharges. This correlation suggests that increasing shear stabilization of turbulence may be playing a role in the enhanced confinement of both the VH and EP H-mode. However, the EP H-mode does not appear to be associated with a strong reduction in turbulence, as might be expected if turbulence suppression due to flow shear were responsible for reduced transport. Instead, measurements show similar fluctuation levels in the H- and EP H-modes without a clear trend differentiating the two regimes. Analysis of the transport and turbulence characteristics, calculations of the edge macro- and micro-stability, and the results of recent experiments aimed at controlling these enhanced confinement regimes, will be presented. *This research was supported by the US Department of Energy under DE-AC05-00OR22725, DE-FC02-04ER54698, DE-AC02-09CH11466, and DE-SC0001288.