H–MODE PEDESTAL CHARACTERISTICS, ELMS AND ENERGY CONFINEMENT IN ITER SHAPE DISCHARGES ON DIII–D*

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The relation of the H–mode pedestal parameters to ELM characteristics and to the overall energy confinement enhancement was studied in discharges with shape and aspect ratio similar to that proposed for ITER. The H–mode confinement enhancement factor, H, is found to be strongly correlated with the height of the pressure pedestal. In different ELM classes H is then set by pedestal pressure characteristic of the class.

At low heating power and low density a distinct class of Type III ELMs is observed. Low density Type III ELMs do not occur above a critical input power which scales roughly as $(n_e I_p)^2$. In terms of local parameters, low density Type III ELMs do not occur if the edge pressure gradient normalized as for ballooning modes, α, is above a critical level which is below the critical α for Type I ELMs. Because of their low α, low density Type III ELM discharges have low edge pressure and associated low H. The strong scaling of the critical input power with density can allow low density Type III ELMs to persist at powers well above the H–mode threshold power and so represent a degraded confinement regime at powers near the H–mode threshold.

At higher density and low heating power a different regime of Type III ELMs is observed which do not occur above a critical temperature. The H factor in this regime increases with edge pressure (as in the other regimes) as the density is increased along the critical temperature boundary. Thus the low temperature Type III ELM regime appears to offer an opportunity for low energy loss per ELM at H values comparable to the Type I ELM regime.

Session Topic: Formation and Structure of Internal and Edge Transport Barriers

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