# Effect of plasma squareness on pedestal width-height scaling and prospects for ELM-free operation

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Strongly shaped plasmas with high squareness could present attractive core-edge integrated scenarios, featuring wide pedestals and high core fusion power [0,1]. We calculate the effect of plasma squareness on the pedestal width-height scaling [2] for multiple tokamaks using a new kinetic ballooning mode (KBM) gyrokinetic threshold model [3]. It is found more square plasmas tend to have wider pedestals with lower average pressure gradients, which could be characterized by ELM-free operation [4]. Pedestal width height-scaling expressions are also found across aspect ratio, showing that squareness could be particularly beneficial at low aspect ratio. These benefits are explained by applying nonlinear regression and a basic machine learning model to the geometric metric coefficients in the pedestal. Combined with peeling ballooning mode (PBM) stability [5], our model will calculate a maximum inter-ELM pedestal width and height based on KBM and non-ideal PBM stability.

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