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H-Mode Pedestal Scaling in DIII-D, AUG and JET
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In H-modes the edge pedestal width determines the height of the pressure pedestal if the pedestal gradient is limited by MHD stability. This study separately compares the temperature and density pedestal widths $w_T$ and $w_n$ from high spatial resolution measurements on DIII-D, AUG, and JET, with theory based models. The ExB velocity shear turbulence suppression predict $w_T/a \propto \rho^*1/2$ to $w_T/a \propto \rho^* (\rho^* \propto T_i/aB_T)$, however, a combination of JET and DIII-D discharges indicated $w_T/a \propto (\rho^*)^{-0.17\pm0.08}$, inconsistent with these theories. EPED1 couples kinetic-ballooning and peeling-ballooning constraints to set pedestal height and width giving $w_{T,n} \propto \beta_p^{1/2}$, $\beta_p = p_{ped}/(\mu_0 B_p^2/2)$. DIII-D data shows a strong correlation with $w_{T,n} \propto \beta_p^{1/2}$, while JET data shows no strong $\beta_p$ dependence. AUG data cannot exclude $w \propto \beta_p^{1/2}$ for $w_T$ but does for $w_n$. The experimental scaling found in this study is beneficial for future fusion devices as the weak $\rho^*$ scaling of $w/a$ implies a scaling with machine size.

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