

Scaling Laws for Intrinsic Toroidal Rotation in High Confinement Mode Plasmas

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Significant toroidal plasma rotation in discharges with no external momentum has been observed on a number of tokamaks in a variety of operating regimes. An empirical scaling study has been undertaken to provide some insight on the important parameters that determine intrinsic rotation in high-confinement regimes. Data were collected from six machines: Alcator C-Mod, DIII-D, JET, Tore Supra, TCV and JT-60U. This database was then used to generate both dimensional and non-dimensional scaling laws. The results of this analysis suggest that intrinsic rotation depends strongly on beta and q^* and is insensitive to v^* and ρ^* . Even the most conservative extrapolations of the resulting expressions suggest that there will be substantial intrinsic rotation in ITER which may be sufficient to suppress resistive wall modes.