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A Gyrokinetic Perspective on the JET-ILW Pedestal DAVID HATCH, MIKE KOTSCHENREUTHER, SWADESH MAHAJAN, PRASHANT VALANJU, XING LIU, Institute for Fusion Studies, University of Texas at Austin
— Simulations using the GENE code based on JET-ILW profiles and equilibria quantitatively capture experimental transport levels for a representative experimental discharge and qualitatively recover the major experimental trends. Microtearing turbulence is a major transport mechanism for the low-temperature pedestals characteristic of unseeded JET-ILW discharges. At higher temperatures, we identify electrostatic ITG-like transport of a type that is strongly shear-suppressed on smaller machines. Consistent with observations, this transport mechanism is substantially reduced by the presence of a low-Z impurity (e.g., carbon or nitrogen at the level of Z-effective˜2). Multiple transport mechanisms, including ITG, ETG, microtearing modes, and neoclassical transport are found to play important roles depending on the pedestal parameters. The picture that emerges involves several parameters—notably, rho*, Z-effective, pedestal top temperature, and separatrix density—mediating the relative roles of these transport mechanisms. This study maps out important regions of this parameter space, providing insights that may point to optimal physical regimes that can enable the recovery of high temperatures on JET.

David Hatch
Univ of Texas, Austin

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