Plasma Shaping Effects on Driftwave Transport and ExB Shear Quenching in GYRO Simulations*

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Over 100 nonlinear gyrokinetic simulations have been performed using the GYRO code [1] with the Miller equilibrium model [2] to investigate the effects of plasma shaping on driftwave turbulence and ExB shear quenching [3]. The simulations show a strongly stabilizing effect of elongation at fixed midplane minor radius. Most of the elongation scaling is found to result from elongation shear rather than the local kappa. The kappa scaling from power law fits to the GYRO results does vary and depends on the wavenumber where the transport peaks. The kappa scaling is weaker when the energy diffusivities peak at low wavenumber (high drive cases) and is stronger when the peak occurs at higher wavenumbers (low drive cases). This effect is stronger for the electrons than for the ions. Triangularity is found to have a weak effect at low elongations and is moderately destabilizing at high elongation. The simulations also show that less ExB shear is needed to quench ITG/TEM transport at high elongation and also for low aspect ratio. Fits to GYRO ExB shear scans for a variety of elongations and aspect ratios results in a simple but reliable new quench rule valid for shaped tokamak geometry.

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[2] R.E. Waltz, R.L. Miller, Phys. Plasmas **6**, 4265 (1999).
[3] J.E. Kinsey, R.E. Waltz, J. Candy, submitted to Phys. Plasmas, 2007.

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