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Quantifying the Stiffness of TGLF in DIII-D*

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The TGLF Gyro-Landau-Fluid transport model [1–3] has been successful in reproducing the observed density and temperature profiles in a wide variety of tokamak discharges from DIII-D, JET and TFTR. Recently, it was shown that the predicting fusion gain for ITER using TGLF are somewhat more pessimistic than previous GLF23 results due to finite aspect ratio effects that are only present in TGLF [4]. A key ingredient in the TGLF predictions of ITER is profile stiffness. A consequence of the stiff core transport is that the fusion Q scales like β_{ped}^2 and also like $1/P_{aux}$ at fixed β_{ped}. Since stiff core transport has such an important role in our ITER predictions we seek to quantify the stiffness of TGLF in DIII-D, look for systematic trends, and make a comparison to ITER. Stiffness is defined as the ratio of the incremental energy diffusivity to the power balance energy diffusivity. The electron and ion stiffness is examined in DIII-D L- and H-mode similarity experiments and in matched discharges with varying toroidal rotation.

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[3] J.E. Kinsey, G.M. Staebler, and R.E. Waltz, Phys. Plasmas **15**, 055908 (2008).
[4] J.E. Kinsey, G.M. Staebler, J. Candy, R.E. Waltz, and R.V. Budny 2010 presented at the 23rd IAEA Fusion Energy Conference, Daejeon, 2010 (International Atomic Energy Agency, Vienna), paper THC/3-3; submitted to Nucl. Fusion.

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