External kink modes for a tokamak plasma with diffuse pressure and toroidal rotation profiles[1] OMAR E. LOPEZ, LUCA GUAZZOTTO, Auburn University — External kink modes constitute one of the most serious MHD instabilities in tokamaks due to the fact that they impose plasma beta (the ratio between the kinetic pressure and the magnetic pressure) limits. There is a tradition of analytical and numerical MHD studies that aims at determining how beta stability limits are modified in the presence of toroidal flows. The present work considers the stability of a high-aspect-ratio, circular plasma with diffuse profiles in the safety factor, pressure, and angular toroidal rotation. Pressure gradient mode coupling across the plasma column and a global shear-flow drive are both captured by the model. By employing a simple analytic form for the diffuse equilibrium state, it has been possible to reduce the stability problem to an eigenvalue linear system of ordinary differential equations for the coupled poloidal harmonics. A sharp-boundary model with a rigid angular toroidal rotation [1] serves as a reference case to understand the effect of diffuse profiles on stability boundaries. [1] R. Betti, Phys. Plasmas **5**, 3615 (1998).

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