Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

On extended analytic theory of 2D ballooning modes in tokamak plasmas PESHWAZ ABDOUL[1], Sulaimani University, College of Science, Department of Physics, Kurdistan Region, Iraq, DAVID DICKINSON, York Plasma Institute, Department of Physics, University of York, Heslington, York, YO10 5DD, UK, COLIN ROACH, CCFE, Culham Science Centre, Abingdon, Oxforshire, OX14 3DB, UK, HOWARD WILSON, York Plasma Institute, Department of Physics, University of York, Heslington, York, YO10 5DD, UK — We have extended the leading order ballooning theory which typically yields more unstable isolated mode (IM) that usually sit on the outboard mid-plane, to higher order where less unstable general mode (GM) sits at a different poloidal location. Our analytic theory has revealed that any poloidal shift of the mode with respect to the outboard mid-plane − arising from the effect of profile variations, for example − is always accompanied by an asymmetry of the radial eigenmode structure. Hence, GMs have radial asymmetry. Our theory can have important consequences, especially for calculations that invoke quasilinear theory to model intrinsic rotation arising from Reynolds stress. This is very important in ITER for which external torques are small. In such theories it is the radial asymmetry in the global GM mode which can generate a Reynolds stress that could in principle contribute to the poloidal flow during the low to high (L-H) mode transition in tokamaks.

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Date submitted: 27 Sep 2016 Electronic form version 1.4