Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Influence of Equilibrium Perpendicular Shear Flow on Peeling-ballooning Instabilities[1] P.W. XI, Peking University, LLNL, X.Q. XU, LLNL — The influence of perpendicular ExB shear flow on peeling-ballooning instabilities is investigated with BOUT++ code. In our simulation, a set of reduced MHD equations are solved for a very unstable equilibrium and a marginal unstable equilibrium in shifted-circular tokamak geometry. For ideal MHD cases without diamagnetic terms and resistivity, we find that flow shear shows dramatic stabilizing effect on peeling-ballooning modes and the stabilizing degree increases with mode number. When the flow shear is large enough, we find the curvature of growth rate verse mode number has the same shape like that for the case with only diamagnetic term, and this implies that diamagnetic term and the shear flow have the same mechanism acting on peeling-ballooning instabilities. The role of Kelvin-Helmholtz term is also investigated and we find it is destabilizing and the effect depends on both flow shear and mode number. For cases with both diamagnetic term and the applied shear flow, modes with intermediate mode number are strongest stabilized while high n and low n mode keep unstable. Based on these results, an ELM trigger sketch is proposed.

[1]Performed for USDoE by LLNL Contract DE-AC52-07NA27344.

X.Q. Xu
LLNL

Date submitted: 12 Jul 2011 Electronic form version 1.4