Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Possible trigger mechanisms for the Double Tearing Mode nonlinear destabilization MIHO JANVIER, YASUAKI KISHIMOTO, JIQUAN LI, Kyoto University — Recently, advanced scenarios seems to be a promising key to continuous operation with fusion plasmas. However, those are limited by MHD instabilities such as the double tearing mode (DTM), which leads to the formation/interaction of magnetic islands along 2 rational surfaces. Calculations with intermediate DTM [1-2] show explosive dynamics from a quasi-steady nonlinear behavior. In the later stage, the energies increase much and the islands deform each other up to total reconnection. To understand the mechanisms leading to such phenomenon, we have conducted an instability analysis of the quasi-steady equilibrium resulting from the first nonlinear stage of the DTM [3] by numerically solving the linearized 2-field reduced MHD equations. In slab geometry, the new equilibrium with steady magnetic islands is found to be unstable. Further investigations near marginal stability (=no nonlinear destabilization), show that the growth rate of the resulting secondary instability is strongly dependent on the amplitude of the flux function, suggesting similar features as a modulational instability. This secondary instability evolution is discussed as a possible mechanism for the generation of strong flows arising in the nonlinear evolution of the DTM, leading to the explosive dynamics. [1] Y.Ishii *et al.*, PRL, **89**, 205002 (2002) [2] Z.X.Wang *et al.*, Phys. Plasmas, **15** 082109 (2008) [3] M.Janvier *et al.*, *to be pub.* JPFR (2010)

Miho Janvier
Kyoto University

Date submitted: 15 Jul 2010 Electronic form version 1.4