Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Theoretical Progress on Runaway Electron Suppression by Massive Gas Injection[1] P.B. PARKS, W. WU, General Atomics, E.M. HOLLMANN, UCSD — Development of techniques to mitigate the severity of emergency plasma termination/plasma disruptions is deemed one of the highest priorities for ITER. The current method of mitigation by massive gas injection (MGI) is not fully understood; whether MGI can achieve sufficient density to avoid avalanche runaway electron formation in the high toroidal electric field E_ϕ is presently uncertain. It will be shown why direct penetration of broad gas jets cannot happen: ablation pressure drag (or magnetic pressure imbalance) exerted over the frontal surface of the jet is too strong for usual jets. Evidence on DIII-D is that MHD processes, occurring predominately during the short thermal quench TQ phase, cause inward diffusion of gas jet ions "stuck" at the plasma edge. To explore this process we have developed a 1-D large-aspect-ratio circular flux surface code for the evolution of E_ϕ with radiation and transport cooling. We use resistive wall boundary conditions, and a 2D axisymmetric CFD code describes the heavily-fueled vacuum region and plasma boundary conditions.

[1]Supported by US DOE under DE-FG03-95ER54309, DE-FC02-04ER54698, and DE-FG02-04ER54758.

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Date submitted: 23 Jul 2007 Electronic form version 1.4