Contribution ID: **156** Type: **Poster**

TH/P3-13: Impurity Mixing in Massive-Gas-Injection Simulations of DIII-D

Wednesday, 10 October 2012 08:30 (4 hours)

Simulations of massive-gas-injection (MGI) in DIII-D have been carried out with the extended MHD code NIMROD in order to study the role of 2D and 3D plasma flows, specifically those associated with the m=1/n=1 instability, in mixing injected impurities into the core. In a simulation with poloidally and toroidally symmetric impurity injection, we find that the impurity distribution does not remain poloidally symmetric through the initial phase of the simulation, rather 2D flow patterns tend to concentrate impurities on the outboard midplane. The first MHD instabilities to appear have q>1, but these modes have little effect on impurity mixing. However, the 1/1 mode that is responsible for the final drop in core T_e during the thermal quench also produces a 3D flow pattern that pulls the outboard localized impurity blob toward the magnetic axis, producing a rapid increase in the core impurity density, and further enhancing core cooling. In further simulations, we switch to poloidally asymmetric impurity sources localized respectively on the high-field- and low-field-sides of the torus. In each case the MHD onset time following the initial edge cooling is found to be approximately the same, and the impurity mixing efficiencies for the three scenarios are compared. Finally, these mixing results are further compared with simulations in which the source is also toroidally asymmetric. The results are analyzed with goal of optimizing the efficacy of massive gas injection, particularly toward the goal of collisional suppression of runaway electrons.

Work supported by the US DOE under DE-FG02-95ER54309.

Country or International Organization of Primary Author

USA

Primary author: Ms IZZO, Valerie (USA)

Co-author: Mr PARKS, Paul B. (General Atomics)

Presenter: Ms IZZO, Valerie (USA)

Session Classification: Poster: P3

Track Classification: THS - Magnetic Confinement Theory and Modelling: Stability