

Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

A numerical study of neutral-plasma interaction in magnetically confined plasmas¹ S. TAHERI, U. SHUMLAK, University of Washington, J. R. KING, Tech-X Corporation — Interactions between plasma and neutral species can have a large effect on the dynamic behavior of magnetically confined plasma devices, such as the edge region of tokamaks and the plasma formation of Z-pinches. The presence of neutrals can affect the stability of the pinch and change the dynamics of the pinch collapse, and they can lead to deposition of high energy particles on the first wall. However, plasma-neutral interactions can also have beneficial effects such as quenching the disruptions in tokamaks. In this research a reacting plasma-neutral model, which combines a magnetohydrodynamic (MHD) plasma model with a gas dynamic neutral fluid model [Meier & Shumlak, POP 19 (2012)], is used to study the interaction between plasma and neutral gas. Incorporating this model into NIMROD allows the study of electron-impact ionization, radiative recombination, and resonant charge-exchange in plasma-neutral systems. An accelerated plasma moving through a neutral gas background is modeled in both a parallel plate and a coaxial electrode configuration to explore the effect of neutral gas in pinch-like devices.

¹This work is supported by a grant from US DOE.

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Date submitted: 13 Jul 2017

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