

Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Implementation of a plasma-neutral model in NIMROD S. TAHERI, U. SHUMLAK, Univ of Washington, J. R. KING, Tech-X Corporation — Interaction between plasma fluid and neutral species is of great importance in the edge region of magnetically confined fusion plasmas. The presence of neutrals can have beneficial effects such as fueling burning plasmas and quenching the disruptions in tokamaks, as well as deleterious effects like depositing high energy particles on the vessel wall. The behavior of edge plasmas in magnetically confined systems has been investigated using computational approaches that utilize the fluid description for the plasma and Monte Carlo transport for neutrals. In this research a reacting plasma-neutral model is implemented in NIMROD to study the interaction between plasma and neutral fluids. This model, developed by E. T. Meier and U. Shumlak, combines a single-fluid magnetohydrodynamic (MHD) plasma model with a gas dynamic neutral fluid model which accounts for electron-impact ionization, radiative recombination, and resonant charge exchange. Incorporating this model into NIMROD allows the study of the interaction between neutrals and plasma in a variety of plasma science problems. An accelerated plasma moving through a neutral gas background in a coaxial electrode configuration is modeled, and the results are compared with previous calculations from the HiFi code.

Sina Taheri
Univ of Washington

Date submitted: 15 Jul 2016

Electronic form version 1.4