

Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Q2D simulations of the neutral gas in the divertors of C-2W

MARCO ONOFRI, PETER YUSHMANOV, TAE technologies, TAE TEAM TEAM — In TAE Technologies' current experimental device, C-2W (also called “Norman”) [1], record breaking, advanced beam-driven field reversed configuration (FRC) plasmas are produced and sustained in steady state utilizing variable energy neutral beams, expander divertors, end bias electrodes, and an active plasma control system. The neutral gas, which is produced in divertors by neutralization of the plasma flow at the divertor target plates, may negatively affect the plasma by reducing the ion and electron temperatures through ionization and charge exchange. To minimize these effects, the divertors have a large volume and a powerful pumping system to reduce the neutral gas density to an acceptable level. The neutral gas in the divertor and its effect on the plasma flow have been studied numerically using the Q2D code. Q2D is a 2D MHD code with distinct ion and electron temperatures, and neutral gas treated as a fluid. The simulations show that the gas distribution in the divertor is substantially nonuniform, which improves the effectiveness of the pumping system and reduces the interaction of the neutrals with the plasma flow. The plasma flow compresses the neutrals near the target plates and reduces the neutral density in the rest of the plasma jet coming from the FRC. Under such conditions, the interaction of neutrals with the plasma is reduced, which allows the divertors to operate normally at higher plasma outflows than were estimated earlier. [1] H. Gota et al., Nucl. Fusion 59, 112009 (2019).

Marco Onofri
Tri Alpha Energy, Inc.

Date submitted: 02 Jul 2019

Electronic form version 1.4