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Optimization of Transport for the FDF[1] V.S. CHAN, A.M. GAROFALO, L.L. LAO, R. PRATER, H.E. ST. JOHN, R.D. STAMBAUGH, GA — To meet the goal of optimizing fusion reactors and enabling development of fusion's energy applications, the Fusion Development Facility (FDF) [1] has to operate with advanced tokamak physics to achieve high confinement and stability. Theoretical modeling suggests this can be achieved with a high edge pedestal and strong plasma shaping. The fusion gain can be enhanced by a peaked density profile consistent with high-performance discharges with low collisionality in existing tokamaks. One of the challenges for FDF is to sustain the plasma in steady state which requires judicious use of external current and flow drive to supplement a large bootstrap current fraction. The high pedestal pressure and peaked density pose challenges for penetration of neutral beam and rf waves for profile control. In this study, a 1-D transport code is used to evaluate the tradeoff between pedestal pressure, confinement, stability and the ability to control and maintain a steady-state current profile. An optimized parametric space for FDF operation will be presented and experimental data supporting the projected FDF performance will be discussed.

[1] V.S. Chan, et al., "Physics Validation of a Fusion Development Facility Based on the Tokamak Approach," submitted to Fusion Sci. Technol.

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C.P.C. Wong
General Atomics

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