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Theory Experiment

An Advanced Tokamak Fusion Nuclear Science Facility (FNSF-AT), V.S. Chan, A.M. Garofalo, R.D. Stambaugh, FDF Team, *General Atomics* — A Fusion Development Facility (FDF) is a candidate for FNSF-AT. It is a compact steady-state machine of moderate gain that uses AT physics to provide the neutron fluence required for fusion nuclear science development. FDF is conceived as a double-null plasma with high elongation and triangularity, predicted to allow good confinement of high plasma pressure. Steady-state is achieved with high bootstrap current and radio frequency current drive. Neutral beam injection and 3D non-resonant magnetic field can provide edge plasma rotation for stabilization of MHD and access to Quiescent H-mode. The estimated power exhaust is somewhat lower than that of ITER because of higher core radiation and stronger tilting of the divertor plates. FDF is capable of further developing all elements of AT physics, qualifying them for an advanced performance DEMO. The latest concept has accounted for realistic neutron shielding and divertor implementation. Self-consistent evolution of the transport profiles and equilibrium will quantify the stability and confinement required to meet the FNS mission.