Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Scenario Development for SPARC[1] ALEXANDER CREELY, DAN BRUNNER, Commonwealth Fusion Systems, ROBERT GRANETZ, MARTIN GREENWALD, NATHAN HOWARD, IAN HUTCHINSON, Massachusetts Institute of Technology, CHARLES KESSEL, Oak Ridge National Laboratory, ROBERT MUMGAARD, Commonwealth Fusion Systems, PABLO RODRIGUEZ-FERNANDEZ, Massachusetts Institute of Technology, BRANDON SORBOM, Commonwealth Fusion Systems, SPARC TEAM — Discharge scenarios in SPARC have been developed using the Tokamak Simulation Code (TSC), showing that the SPARC design can sustain the baseline plasma shape and current of 7.5 MA for 10 seconds. Like any tokamak, designing SPARC involves more than consideration of only the peak performance operating point. One must also be able to get to that operating point robustly, starting with plasma initiation, completing the plasma current ramp, and then eventually ramping the current down after the flattop. This presentation will describe time-dependent Grad-Shafranov simulations performed with TSC [S. C. Jardin et al., *J. Comp. Phys.* 66, 481 (1986)] in order to determine the requirements on the central solenoid and poloidal field coils for SPARC. Included in these simulation are other time-dependent phenomena, such as plasma shaping control and feedback controlled vertical stability. Simulations show that a current ramp rate of 1 MA/s is feasible, giving a total discharge length of approximately 25 seconds. Further refinement of these simulations will inform the design of SPARC's central solenoid, poloidal field coils, vacuum vessel, and vertical stability feedback coils.

[1]Research supported by Commonwealth Fusion Systems

Alexander Creely
Massachusetts Institute of Technology

Date submitted: 01 Jul 2019 Electronic form version 1.4