PPPS 2019



Contribution ID: 1245

Type: Poster

4P41 - Overview of the C-2W Formation Section Pulsed Power

Thursday 27 June 2019 16:00 (1h 30m)

To achieve the goal of fusion TAE Technologies developed the C-2W experiment, an advanced beam-driven field-reversed configuration (FRC), which is the world's largest compact toroid device. It is a linear system which consists of two theta-pinch formed FRCs, translated and merged in a confinement vessel. Each of C-2W's Formation sections consists of two sets of magnets. First, a rotating magnetic field (RMF) which consists of a set of saddle coils triggered in phase such that the radial magnetic field rotates azimuthally. The RMF provides the initial plasma ionization. Secondly, a set of axial coils, fired sequentially with sub-microsecond precision, form and accelerate the FRC by means of a Bias and Main Reversal (MR) circuits. A wide range of charge and timing settings are possible, allowing for flexibility in the generated target.

The pulsed power consist of 190 capacitors with more than 2MJ of stored energy transferred by 516 switches into the load through ~30km of high voltage coaxial cable. The MR circuit provides peak power in excess of 100GW. Current rise times range from 5μ s to 130 μ s, where peak current in each of the axial coils exceeds 300kA. Total system current is measured by 380 rogowski probes.

With 440 pseudo-spark switches requiring heaters to control breakdown characteristics, we have developed heater control system, with remote monitoring and setpoint adjustment.

Details of the various systems will be presented.

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Session Classification: Poster - Charged Particle Beams and Accelerators and High Energy Density Plasmas and Applications

Track Classification: 4.1 Fusion (Inertial, Magnetic and Alternate Concepts)