

Systems and methods that facilitate the formation and maintenance of new High Performance Field Reversed Configurations (FRCs). An FRC system for the High Performance FRC (HPF) includes a central confinement vessel surrounded by two diametrically opposed reversed-field-theta-pinch formation sections and, beyond the formation sections, two divertor chambers to control neutral density and impurity contamination. A magnetic system includes a series of quasi-dc coils axially positioned along the FRC system components, quasi-dc mirror coils between the confinement chamber and the adjacent formation sections, and mirror plugs between the formation sections and the divertors. The formation sections include modular pulsed power formation systems that enable FRCs to be formed in-situ and then accelerated and injected (=static formation) or formed and accelerated simultaneously (=dynamic formation). The FRC system further includes neutral atom beam injectors, a pellet injector, gettering systems, axial plasma guns and flux surface biasing electrodes.