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Overview of the Lockheed Martin Compact Fusion Reactor (CFR) Pulsed Power Systems

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The Lockheed Martin Compact Fusion Reactor (CFR) Program endeavors to quickly develop a compact, 100 MWe class fusion power plant with favorable commercial economics and military utility. The CFR uses a diamagnetic, high beta, magnetically encapsulated, linear ring cusp plasma confinement scheme. One advantage of the CFR is how the size lends itself to an iterative, rapid prototyping design cycle, economically demonstrating key physics results while successively increasing in size and engineering complexity towards a $Q > 1$ device. Experiments began on a tabletop and have grown to the order of a few cubic meters in volume. As the scale of each experiment has grown, so too has the demand for pulsed power systems for plasma experimentation. The CFR pulsed power systems will be reviewed, including power supplies designed for plasma generation, plasma heating, and driving of confinement coil systems. Power supply topologies include IGBT switched DC/DC converters, resonant inverters, and pulse forming networks. A high-level overview of each existing system and their applications on the CFR will be presented, and projections for future pulsed power system development will be discussed.

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