

## DEVELOPMENT OF A NEW ERROR FIELD CORRECTION COIL (C-COIL) FOR DIII-D\*

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The C-coil recently installed on the DIII-D tokamak was developed to reduce the error fields created by imperfections in the location and geometry of the existing coils used to confine, heat, and shape the plasma. These error fields can have an adverse effect on the plasma performance. First results from C-coil experiments on DIII-D include stable operation in a 1.6 MA plasma with a density less than  $1.0 \times 10^{13} \text{ cm}^{-3}$ , nearly a factor of three lower density than that achievable without the C-coil. The C-coil has also been used in magnetic braking and high energy particle confinement experiments.

The C-coil system consists of six individual saddle coils, each  $60^\circ$  wide toroidally, spanning the mid plane of the vessel with a vertical height of 1.6 meters. The coils are located at a major radius of 3.2 meters, just outside of the toroidal field coils. The actual shape and geometry of each coil section varied somewhat from the nominal dimensions due to the large number of obstructions to the desired coil path on the already crowded tokamak. Each coil section consists of four turns of 750 MCM copper cable banded with stainless steel straps within the web of a 3 in.  $\times$  3 in. stainless steel angle metal frame. The C-coil structure was designed to resist peak transient radial forces (up to 1800 lb./m) exerted on the coil by the toroidal and poloidal fields. The coil frames were supported from existing poloidal field coil case brackets, coil studs, and various other structures on the tokamak. Details of the design and installation of the C-coil system for the DIII-D tokamak will be presented.

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