

# Design of a Coaxial DC Break (CDCB) for use in ICRH antenna.

## 1. Background of the problem

High power radio frequency waves in the megahertz frequency range have a wide range of application like tokamak fusion reactor, accelerators, aerospace and defense sector. The RF waves can be transmitted via rigid coaxial transmission lines (TL) at high power. In order to isolate the electrical ground of the antenna and RF source, a DC block is generally employed. The DC block would isolate both parts at DC to certain 100s of kHz where as it should allow uninterrupted transmission of RF waves at the designed frequency i.e. in this case few tens of MHz. Usually, only return conductor is made isolated because of simplicity. However, the present work is to design a compact component which could isolate both inner and return conductors. In this work a novel design of CDCB would be employed to achieve desired RF parameters.

## 2. Scope of work

The student would survey available literature about high power TL, theory of DC blocks and impedance transformer. The model has to be designed in a commercial 3D structural simulator Ansys-HFSS and various parameters would be optimized. A prototype would be fabricated and experimentally tested. Fabrication may include a novel method using liquid nitrogen bath.

## 3. Academic gain of the student

Understanding knowhow of high power TL design, Ansys HFSS (High Frequency Structural Simulator) and design of RF components.

Relevant references:

1. <https://www.ansys.com/en-in/products/electronics/ansys-hfss>
2. K. Mishra et. al. Journal of Physics: Conference Series 208 (2010) 012017

**Eligibility: Only students of Mechanical branches can submit their application at**

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