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## Design and Analysis of CFETR CSMC Cooling Loop

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The Central Solenoid Model Coil (CSMC) of China Fusion Energy Test Reactor (CFETR) is currently in the design and manufacture process. CSMC assembly consists of the winding pack, an outer NbTi coil, a middle Nb<sub>3</sub>Sn coil, an inner Nb<sub>3</sub>Sn coil and a pre-load structure. The highest field of the model coil is 12T, while the highest change rate of magnetic field of the conductor is 1.5T/s. Due to the AC losses during charging, a huge heat load will be produced in the model coil. In order to make the coil work properly in normal condition, a well-designed and precisely-analyzed cooling loop plays an important role.

In this paper, the design of the cooling loops is based on the calculation results of the AC losses deposited on the model coil. The length of the cooling channels, together with the thermo-hydraulic parameters such as inlet pressure, temperature, mass flow rate are optimized. In addition, thermal hydraulic analysis for the cooling loop located in the worst condition of the model coil was conducted to recognize the temperature and mass flow rate change over time. The hydraulic model, the material properties and the heat loads involved in the analysis are given, and the results of the analysis are presented.

### Eligible for student paper award?

No

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