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# Wed-Mo-Po3.03-02 [18]: Quench recovery analysis of the JT-60SA superconducting magnets

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JT-60SA is one of the experimental nuclear fusion reactors with superconducting magnets. It is a joint international research and development project involving Japan and Europe. The transitional change of temperature distribution of these magnets in recovery from the coil quench is investigated.
The quench recovery period is necessary to be confirmed. Generally, the maximum temperature drop of magnets is able to be confirmed by checking the thermometer attached to the outlet of the helium flow path. However, the maximum temperature of the JT-60SA central solenoid (CS) is not able to be measured during quench recovery. A CS module is composed of the 52 layers pancake coils. The 26 helium flowing paths are in a one module and two pancake coils are cooled in series in one flow path. The refrigerator supplies helium at 4.4 K to each flowing path in nominal operation.
The flowing paths of CS is C-shaped and both of the outlets and the inlets of helium are on the outer periphery surface of the CS modules. Due to this C-shaped flowing path, heat exchanges between the inlet flow paths and the outlet flow paths. The CS outer periphery side becomes colder than the inner periphery side. The typical issue is the CS inside temperature is not able to be measured by the thermometers on the flowing paths.
In case of a quench, the refrigerator stops helium supply in order to shut out large heat load from the quenched magnet. Helium will be supplied again when the magnet pressure become low enough. In this work, the CS temperature distribution change during quench recovery is calculated by using the thermal fluid simulation codes, and the period required for recovery is investigated.

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