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A Study of Irradiation Effects on Thermal Characteristics of COMET Pion Capture Solenoid

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COMET experiment is aiming to search for a muon to electron transition at J-PARC. It requires the muon beam with high intensity of $10^{11} \mu^-/s$. The muon beam is produced by using a series of superconducting solenoids. The solenoid magnet in which the production target is embedded, called as COMET pion capture solenoid, is estimated to be exposed to severe radiation such as the neutrons of $5 \times 10^{21} \text{ n/m}^2$. Since the irradiation induced a degradation of thermal conductivity in the thermal conduction path in the coils. The situation may cause a coil temperature rise during the beam operation and also induce difficulties in the quench protection. Therefore the quench simulation code is developed to calculate temperature distributions during a beam operation and at a quench including the irradiation effects. The estimated effects on the thermal characteristics of the superconducting coil will be presented in this paper.

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