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Wed-Af-Po3.16-07 [25]: Quench simulation of a REBCO undulator coil

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Udulators are important insertion devices for synchrotron radiation light source such as storage ring and free electron laser facility. Comparing with undulators based on permanent magnet, superconducting undulators may maintain high magnetic fields with a shorter period length. Superconducting undulators based on NbTi coil were successfully developed and are now in operation. Recently, significant advances were achieved in research and development of REBCO (RE=rare earth, barium copper oxide) coated conductors (CCs). Due to its superior superconducting and mechanical properties, REBCO becomes promising candidate to further improve an undulators'magnetic structure and simplify the cooling system. However, quench protection remains a critical issue of REBCO coil due to a very low normal zone propagation velocity (NZPV). In this paper, quench behavior of a REBCO undulator coil is investigated by numerical simulation based on finite element method. Numercial model of the undulator coil is built. Quench characteristics of minimum quench energy and NZPV are obtained. Quench protection methods such as subsection, diodes and quench heaters are simulated. Effect of different protection methods on hot-spot temperature are studied and compared.

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