A Simplified Model to Calculate AC Losses in Large 2G HTS Coils

AC losses are of great significance to quantify the performance of high temperature superconducting (HTS) devices. This paper presents a simplified model to calculate AC losses in large 2G HTS coils, which serves as a baseline to study HTS large scale applications such as electric machines. The model is developed by disregarding the multilayer architecture of 2G HTS tapes and then it goes to homogenize insulation layers and epoxies filled in HTS coils. Therefore, a large coil consisting of multiple HTS tapes can be analysed as a whole domain without the necessity of considering inner details. The model presented uses H formulation which directly solves magnetic fields, and the general partial differential equations (PDEs) module in Comsol Multiphysics is used to implement the model. Afterwards, the model is used to simulate the excitation stage of a racetrack HTS coil with 350 tapes. The AC losses in different excitation speeds are studied.