Contribution ID: **401** Contribution code: **WED-PO2-712-09** Type: **Poster**

Modelling of magnetization loss of CORC cables with three material laws and comparison with measurements

Wednesday, November 17, 2021 10:30 AM (20 minutes)

Improvement in the production technology of a Conductor on a rounded core (CORC) cable allows it to reach high engineering current densities and therefore becomes suitable for high fields magnets like MRI or acceleration magnets. Due to high packed tapes within the cable being magnetically coupled, this results in an increase in the magnetization loss, the load on the cryogenic system and screening current creates instability of the magnetic field in the magnets. We modelled 3D CORC cable of monolayer and multilayers with up to 6 tapes and three material laws by H-formulation FEM model. Studying the material laws using constant J_c, a Kim-like magnetic field dependence J_c(B) model, and an adaptive angular magnetic field dependence J_c(B,Theta) model, shows significant difference and improvement in the estimation of magnetization losses by each law. The models reveal the 3D current in the applied field and the magnetization losses were compared with measured values at 77 K and up to 100 mT applied magnetic field. A further understanding of the magnetization losses will aid in the development of magnetic performance within a cable.

Acknowledgement

M.U.F. and M. C. thank for the funding support received by the College of Science and Engineering of the University of Leicester. M. C thanks also the EPSRC DTP Studentship program. This work was supported by the UK Research and Innovation, Engineering and Physical Sciences Research Council (EPSRC), through the grant Ref. EP/S025707/1 led by H.S.R. All authors acknowledge the use of the High Performance Computing facility ALICE at the University of Leicester.

Primary author: Dr KAPOLKA, Milan (University of Leicester)

Co-authors: FAREED, Muhammad Umar (University of Leicester); CLEGG, Matthew (University of Leicester); Dr RUIZ, Harold (University of Leicester)

Presenter: Dr KAPOLKA, Milan (University of Leicester)

Session Classification: WED-PO2-712 Losses in HTS conductors