



Contribution ID: 128

Type: **Regular 15 minutes Oral Presentation**

Role of electrostatic charges in the calculation and measurement of AC losses in superconducting coils.

Tuesday 29 August 2017 16:15 (15 minutes)

Dissipation of energy in a superconducting coil generating magnetic field that varies in time could be evaluated locally as the product of electrical field and current density. The effect of electric field exerting force and accelerating the electric charge carriers that transport the current is commonly incorporated into AC loss calculation by inserting a realistic current-voltage dependence e.g. in form of a power law. A direct experimental confirmation of this computation approach would require the placement of a suitable sensor inside the conductor forming the coil winding. Therefore such approach to AC loss analysis is ruled out for real superconducting coils. On the other hand one can measure the total voltage appearing at the coil winding. We prove that this voltage is in fact the electrostatic field produced by the electric charges accumulated at the conductor non-uniformities like the coil terminations. Practical aspects of this approach are demonstrated analysing a series of thought experiments on objects with increasing complexity.

Submitters Country

Slovakia

Author: Dr GÖMÖRY, Fedor (Slovak Academy of Sciences)

Presenter: Dr GÖMÖRY, Fedor (Slovak Academy of Sciences)

Session Classification: Tue-Af-Or18

Track Classification: G4 - Losses in Conductors and Coils