AC Losses in Non-inductive Coated Conductor Coils with Field-dependent Critical Current Density

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Abstract - In this paper we consider two different finite-element models for computing ac losses in coils composed of coated conductors: a 2-D model based on solving Maxwell equations by means of edge elements and a 1-D model based on solving the integral equations for the sheet current density in the tapes. The models are tested for a configuration of practical interest, a non-inductive solenoidal coil for fault current limiter applications. We focused our attention on the conditions when differences between the two models are expected to emerge, for example when the tapes are closely packed together or where the dependence of the critical current density on the local magnetic field is taken into account. We present and discuss several cases, offering possible explanations for the observed differences of ac loss values.

IEEE/CSC & ESAS EUROPEAN SUPERCONDUCTIVITY NEWS FORUM (ESNF), No. 11, January 2010
Published in *Supercond. Sci. Technol*. (*SuST*) 23, 034017 (2010)