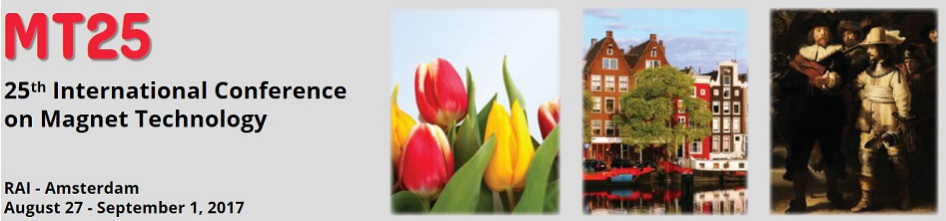

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Effect of striating coated conductors on reducing shielding-current-induced fields in pancake coils exposed to normal magnetic fields

Tuesday, 29 August 2017 15:30 (15 minutes)

The large magnetization caused by shielding current in coated conductors can deteriorate the field qualities of magnets. One of the counter measures of this large magnetization is the striation of a coated conductor to divide its superconductor layer into multifilaments. A striated coated conductor was fabricated by Furukawa Electric Co., Ltd. and SuperPower Inc. The superconductor layer of a coated conductor was cut into four filaments by laser, and, then, which was plated with copper. Plating copper results in the finite transverse conductance between filaments. Pros of this finite transverse conductance is the current sharing between filaments which is preferable from the viewpoint of stability and protection. The cons is electromagnetic coupling between filaments. In order to confirm the effect of striation, a pancake coil was wound with this striated coated conductor and was placed in a cusp magnetic field, which was normal to the coated conductors. The temporal change of the magnetic field near the pancake coil was measured by using a Hall sensor to look at the effect of the striation to decay the shielding current rapidly. Another pancake coil was wound with a reference non-striated coated conductor, and the similar experiment was carried out. Numerical electromagnetic field analyses were made while considering the finite E-J characteristics of superconductor layer and the transverse resistance between filaments, which was determined through the coupling loss measurements of short samples. The electromagnetic behaviors of the striated coated conductor was clarified by the electromagnetic field analyses. The effect of the striation was confirmed through the comparison between numerical and experimental results.

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