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## Comparison between AC loss measurements and analyses in coil assemblies with different geometries and conductors

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When coated conductors are applied to devices whose transport current or applied magnetic field is time-dependent, ac loss in coils is a major issue which needs to be accurately evaluated and addressed. Electromagnetic field analyses are effective tools not only for evaluating and characterizing ac losses in entire coils wound with coated conductors, but also for estimating the ac loss density distribution in coils. The ac loss density distribution depends on the coil structure: namely, the magnetic field distribution in the coil and its superconducting characteristics. In this work, we focus on how the ac loss density distribution is affected by the coil structure, and ac loss measurements and analyses are compared. We built a cross-sectional model for electromagnetic field analyses for the coil assemblies. In this model, the detailed three-dimensional configuration of the coil assemblies was ignored and approximated as axisymmetric. The nonlinear electric field ( $E$ )-current density ( $J$ ) characteristics of each conductor, which depend on both the magnitude and the orientation of the magnetic flux density, are incorporated into this model using a formulation based on the measured  $E$ - $J$  curves. In order to compare with the results of the numerical analyses, we carried out ac loss measurements on coil assemblies comprising stacks of double pancake coils (DPCs). The coil assemblies have different number of DPCs and the conductors used for coil windings are from different tape manufacturers. An electrical method was used for the ac loss measurements.

### Submitters Country

Japan

**Primary author:** Mr SOGABE, Yusuke (Kyoto University)

**Co-authors:** Dr JIANG, Zhenan (Robinson Research Institute); WIMBUSH, Stuart (Victoria University of Wellington); Dr STRICKLAND, Nick (Victoria University of Wellington); Dr STAINES, Michael (Robinson Research Institute, Victoria University of Wellington); Prof. LONG, Nicholas (Robinson Research Institute, Victoria University of Wellington); Prof. AMEMIYA, Naoyuki (Kyoto University)

**Presenter:** Mr SOGABE, Yusuke (Kyoto University)

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