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Sat-Af-Or5-06: AC loss measurement for parallel-wound HTS coils

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This presentation reports AC loss study for parallel-wound HTS coils used for AC applications, e.g. fusion PF coil and rotational machines. The reason for parallel winding is to increase the current rating of winding without increasing too much the winding inductance. We made several four-conductor parallelly wound HTS coils and measured both the current distribution and AC loss. Our measurement unveils that the transport current AC loss of this type of HTS coil is frequency-dependent. Due to the impedance mismatch of the four parallelly wound HTS tapes, the measurement shows a frequency-dependent current sharing among the HTS tapes: the higher the frequency, the bigger the current sharing. For the same coil, current sharing is different with different frequency, leading to a frequency-dependent transport loss. Our study also leads to a useful conclusion that achieving inductance matching for the parallel-wound HTS coils is important for reducing AC losses.

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