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A Digital Electrometric Method for Measuring the AC loss of a HTS Coil

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Abstract-AC loss is an important factor in designing and running of high temperature superconducting (HTS) devices. Recent years have seen many studies on the measurement of AC loss of HTS coils carrying sine-wave current. However, in fact, many practical HTS devices don't operate under sine-wave current. For instance, the current waveform of a superconducting magnetic energy storage (SMES) coil is similar to triangle. In order to measure the AC loss of a HTS coil carrying triangular-wave current, this paper proposes a digital electrometric method. In this method, the voltage and the current of the coil are converted to digital signals so that the signal can be processed by computer. The AC loss is obtained by processing the signals and the details of the algorithm are given. We built an experiment platform based on this method. Simulations and experiments were conducted under identical circumstances and the results were compared to validate the measuring method. Furthermore, real time measurement on the AC loss of HTS coils can be implemented by using DSP instead of computer to process data.

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