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## Modelling and Investigation on the AC loss of the 2G YBCO tape influenced by High-order power harmonics

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Due to the wide application of non-linear loads and switching electronic devices, the current in the power grid is often mixed with many harmonic components. The non-sinusoidal currents will have certain effect that unstable voltage and increased heat dissipation on electrical equipment made of superconducting materials, such as superconducting motors, SMES and HTS magnets. In this paper, high-order harmonics with different THD values are applied to the coated superconducting tape of magnetic substrates. The influence of power harmonics on the AC loss of the 2G HTS tape is discussed using the finite element method based on the H formulation. On this basis, we considered two different factors that magnetic substrate and harmonic frequency multiplication. The results show the higher harmonic content, the greater the AC loss value of the superconducting tape. Under the condition of applying AC harmonics and external magnetic field at the same time, the AC loss value of the tape with magnetic substrate is several times higher than that of the tape without substrate.

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