



Superconductivity for
Sustainable Energy Systems
and Particle Accelerators



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AC Loss Reduction in Round HTS Cables From Filamentized Coated Conductor Tapes

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AC loss generated in a superconducting cable during variation of magnetic field is essential property affecting its use in pulsed magnets for particle accelerators or fusion tokamaks. It can be shown, that in round high-temperature superconducting (HTS) cables made from coated conductor (CC) tapes, the hysteresis loss is proportional to the tape width. Then a plausible measure for reducing it is the division of superconducting layer into parallel filaments.

We have verified that in short models of round cables, containing in different arrangements two layers of 10 standard helically laid tapes, at magnetic field amplitudes surpassing 0.1 T the loss did not depend on the cable architecture. Substantial reduction of hysteresis loss is obtained in the cable models from novel CC tapes with a filamentized REBCO layer produced in an industrial process utilizing a special 3D patterned metal substrate. However, an additional loss generated by the currents coupling individual filaments appears. Then, further research should address the improvement of critical current and optimization of metallic layers, allowing a migration of current between filaments without substantial increase of coupling loss.

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