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## **Sat-Af-Or5-01: Effect of magnetic coupling on the magnetisation losses of Roebel cables of striated REBCO strands**

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Magnetisation losses of Roebel cable samples with striated REBCO strands were measured at different temperatures between 4K and 85K in ac magnetic fields up to 0.2T. While the losses of Roebel cables with non-striated strands were shown previously in quantitative agreement with the losses of magnetically coupled two side-by-side tape stacks as thin Norris' strips, significant differences in the loss behaviour were found in Roebel cables with striated strands. Firstly, the peak loss factor occurred at a lower field than that of the non-striated, contrary to the expectation of no change in the peak position in isolated filaments by striation. In reality, there is strong magnetic coupling among the filaments in striated strand and the present work explains how such a coupling would lead to the desired lowering of the peak position using both the analytical results of magnetisation for infinite in-line array of thin strips and numerical results for striated strands with finite filaments. Secondly, our experimental results also showed the stacking of striated strands did not exhibit the shift of the position of peak loss factor to a higher field, as expected for a higher critical current by strand stacking. Using numerical modelling, the present work demonstrates that such a desirable but unexpected behaviour is most likely due to small and random misalignments of the striated strands in the stacks. In conclusion, the present work highlights the fundamental role of magnetic coupling among striated strands in the reduction of magnetisation losses and its unique presence for REBCO strands as thin Norris' strips.

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