Contribution ID: **858** Type: **Invited Oral**

Sat-Af-Spe1-06: [Invited] Characterization of electromechanical properties of striated REBCO CC tapes for TORT cables with reduced magnetization AC losses

Saturday 5 July 2025 15:15 (15 minutes)

REBCO CC (Rare-earth barium copper oxide coated conductors) are the best candidate materials for superconducting TORT (tapes on round tube) cables and high-field magnets due to their excellent mechanical strength, high current-carrying capacity, and magnetic strength. It is currently known that the AC (alternating current) loss can be decreased when TORT cables are made using REBCO multi-filamentary tapes. However, when winding such geometrically adjusted tapes into cables, their mechanical robustness is equally crucial. This mechanical robustness is important both during the winding and cable production process as well as during the electromagnetic environment loads themselves, thus raised concerns around striated tape lifetimes. This work involved the preparation of various types of 2 mm wide REBCO striated tapes through chemo-mechanical striating, followed with deposition of thermal and chemical stabilization multilayers. Subsequently, the striated tapes were bent at a lay angle of 45° over bending diameters from 13 mm to 1 mm and current-carrying performance under self-field conditions at 77 K were measured. Electrical measurements demonstrated that up to 2 mm of bending diameter, the striated tapes did not exhibit any *Ic* deterioration. Conversely, at 3 mm bending diameter, non-striated tapes started to deteriorate. The SEM FIB observation proved that the adhesion of additional stabilization layers in the filaments was not disrupted. The filament edges marked the key zone in terms of delamination or crack formation. The simple bending tests of striated tapes continued with high cycle fatique studies at 77 K and self-field conditions. Finally, the effect of groove geometrical irregularities on the mechanical performance of striated REBCO tapes were supported by FE (finite element) analysis and correlated with experimental results.

Author: Dr CUNINKOVÁ, Eva (Faculty of Materials Science and Technology in Trnava, Slovak University of Technology in Bratislava, Jána Bottu 2781/25, 917-24 Trnava, Slovakia)

Co-authors: Dr KUJOVIČ, Tomáš (Institute of Electrical Engineering, Slovak Academy of Sciences, Dúbravská cesta 9, 841-04 Bratislava, Slovakia); Mr FROLEK, Lubomír (Institute of Electrical Engineering, Slovak Academy of Sciences, Dúbravská cesta 9, 841-04 Bratislava, Slovakia); Dr RIES, Rastislav (Institute of Electrical Engineering, Slovak Academy of Sciences, Dúbravská cesta 9, 841-04 Bratislava, Slovakia); Mr FERENČÍK, Filip (Faculty of Materials Science and Technology in Trnava, Slovak University of Technology in Bratislava, Jána Bottu 2781/25, 917-24 Trnava, Slovakia); Dr SZÁRAZ, Zoltán (Faculty of Materials Science and Technology in Trnava, Slovak University of Technology in Bratislava, Jána Bottu 2781/25, 917-24 Trnava, Slovakia); Dr DOBROVODSKÝ, Jozef (Faculty of Materials Science and Technology in Trnava, Slovak University of Technology in Bratislava, Jána Bottu 2781/25, 917-24 Trnava, Slovakia); Dr SKARBA, Michal (Faculty of Materials Science and Technology in Trnava, Slovak University of Technology in Bratislava, Jána Bottu 2781/25, 917-24 Trnava, Slovakia)

Presenter: Dr CUNINKOVÁ, Eva (Faculty of Materials Science and Technology in Trnava, Slovak University of Technology in Bratislava, Jána Bottu 2781/25, 917-24 Trnava, Slovakia)

Session Classification: Sat-Af-Spe1 - [Special Session] High Current HTS Cables for Fusion and Beyond