Contribution ID: **360** Type: **Contributed Oral**

M3Or3B-06: Flux Jumping in High Magnetic Fields for Stack Tape Cables and its Mitigation

Wednesday 21 May 2025 15:15 (15 minutes)

This study presents experimental measurements of the magnetization of ReBCO tape stack cables in magnetic fields up to 30 T at 4.2 K. The *M-H* response of these conductors is important for various applications, including particle accelerators, fusion reactors, and other emerging technologies. We employed a susceptibility technique, utilizing the NHMFL's Bitter magnet as the primary coil. A custom-designed sample holder was fabricated, featuring a secondary pick-up coil and a compensating bucking coil. Our experiments shows large scale flux jumping, present at low fields, but also persistent up to 17 T. This effect, while initially surprising, is on reflection clearly required for such stacks because the penetration fields becomes dependent on sample width rather than film thickness, and the relevant length exceeds the critical width for flux jumping. We attempted to mitigate this effect by introducing small gaps between the tapes to allow for flux penetration in the stack and thus to reduce the effective penetration depth. To do this, we introduced Cu and G-10 spacers between the tapes. We prepared and measured three distinct samples: a 60-tape ReBCO stack cable without spacers, a 60-tape ReBCO stack cable with Cu spacers, and a 30-tape ReBCO stack cable with G-10 spacers. As anticipated, the flux jumps were significantly reduced when using Cu spacers and were completely eliminated with G-10 spacers. These findings have significant implications for the implementation of tape stack cables in high-field applications. The results of this study are vital for advancing our understanding of ReBCO tape stack cables and their potential uses in fusion magnets, particle accelerators, and other cutting-edge technologies.

Author: GARG, Tushar (The Ohio State University)

Co-authors: JAROSZYNSKI, Jan (National High Magnetic Field Laboratory FSU); CHOI, Eun-Sang (National High Magnetic Field Laboratory FSU); MAJOROS, Milan (The Ohio State University); SUMPTION, Mike (The Ohio State University); COLLINGS, Edward (The Ohio State University)

Presenter: GARG, Tushar (The Ohio State University)

Session Classification: M3Or3B - AC Loss