

## AC Loss Reduction in Filamentized YBCO Coated Conductors with Virtual Transverse Cross-cuts

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**Abstract** - While the performance of  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$  (YBCO)-based coated conductors under dc currents has improved significantly in recent years, filamentization is being investigated as a technique to reduce ac loss so that the 2nd generation (2G) high temperature superconducting (HTS) wires can also be utilized in various ac power applications such as cables, transformers and fault current limiters. Experimental studies have shown that simply filamentizing the superconducting layer is not effective enough to reduce ac loss because of incomplete flux penetration in between the filaments as the length of the tape increases. To introduce flux penetration in between the filaments more uniformly and reduce the ac loss, virtual transverse cross-cuts were made in superconducting filaments of the coated conductors fabricated using the metal organic chemical vapor deposition (MOCVD) method. The virtual transverse cross-cuts were formed by making cross-cuts (17 ~ 120 mm wide) on the IBAD (ion beam assisted deposition)-MgO templates using laser scribing followed by depositing the superconducting layer (~ 0.6 mm thick). AC losses were measured and compared for filamentized conductors with and without the cross-cuts under applied peak ac fields up to 100 mT. The results were analyzed to evaluate the efficacy of filament decoupling and the feasibility of using this method to achieve ac loss reduction.

**Index Terms** - AC Loss, Coated Conductor, Filamentization, YBCO.

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