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## M2Or2E-01: [Invited] Progress Report on Mechanical Stress in High-Field REBCO Magnet

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In this study, we present the understanding of magnetic stress in REBCO (Rare Earth Barium Copper Oxide) magnets, based on experimental results from a 26.4 T magnet [1] and a 45.5 T magnet [2]. Magnetic stress in a high-field magnet is a critical factor that can affect their overall performance and reliability. We address three approaches for developing an understanding of magnetic stress in high-field REBCO magnets. The first approach is based on the continuum mechanics, has been conventionally used for wet-wound magnets (e.g. epoxy impregnated magnet), mostly LTS (low temperature superconductor) magnets. The second approach is the contact mechanics, which was proposed to explain mechanical behavior of 26.4 T all REBCO no-insulation magnet. This approach enables considering both turn-to-turn separation and contact of dry wound magnets. Lastly, we are considering how to affect the screening current in REBCO magnet to the magnetic stress based on the results of the 45.5 T magnet, as known as screening current induced stress (SCS). Furthermore, we discuss the implications of our findings for the development of next-generation REBCO magnets for various high-field applications.

[1] Yoon, Sangwon, et al. "26 T 35 mm all-GdBa<sub>2</sub>Cu<sub>3</sub>O<sub>7-x</sub> multi-width no-insulation superconducting magnet." *Superconductor Science and Technology*, 29.4 (2016): 04LT04.

[2] Hahn, Seungyong, et al. "45.5-tesla direct-current magnetic field generated with a high-temperature superconducting magnet." *Nature*, 570.7762 (2019): 496-499.

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