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## **Tue-Mo-Po2.05-04 [27]: An Analytic Study on Electromechanical Conditions for Compressive Electromagnetic Stress in an HTS Magnet**

*Tuesday 24 September 2019 08:45 (2 hours)*

Compressive magnetic radial stress is favored, over tensile one, for a high field magnet, mainly because it lowers the overall peak magnetic stress within the windings of the magnet. It is of particular importance for a no-insulation (NI) high temperature superconductor (HTS) magnet, because the compressive radial stress leads to "good" turn-to-turn contact that is essential for current sharing in the NI HTS coils and consequent self-protecting behaviors. This paper presents an analytic study to determine electromechanical conditions of an HTS magnet in order to make the magnetic radial stress to be compressive. Depending on key magnet design parameters such as target center field, magnet current density, inner winding diameter, and radial build, we have shown that electromechanical conditions for a high field HTS magnet to have compressive radial stress may be analytically pinpointed. The results may provide an insight for magnet engineers to better overview the electromechanical behaviors of their high field HTS magnets at the early design stage.

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**Primary author:** PARK, Jeonghwan (Seoul National University)

**Co-author:** HAHN, Seungyong (Seoul National University)

**Presenter:** PARK, Jeonghwan (Seoul National University)

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