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The trapped magnetic field of a joint-less second-generation high temperature superconducting coil.

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The joint-less coil is wound by “wind-and-flip” technique. Due to the absence of resistive joint, the coil enable the current to flow in an absolutely superconducting closed loop, therefore it can load a DC current persistently without power supply. Therefore, the coil shows a great potential on MRI/NMR, permanent magnet and rotor magnet of HTS machines. This paper is to study the trapped magnetic field of a joint-less second-generation high temperature superconducting (HTS) coil. A numerical model based on H-formulation is built to analyze the underlying mechanism of trapping field. A joint less coil with 40 turns is fabricated and zero field cooling tests are performed on it. Comparison is conducted on the trapped magnetic field from measurements and simulations. The numerical model is validated by the good agreement between them. Then the physical mechanism of trapping field is elucidated by the model. The influence of external field amplitude, critical current and external field reduction rate on the trapped field is analyzed.

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