



Contribution ID: 785 Contribution code: TUE-PO1-513-16

Type: Poster

The research on double pancake coil of 1MJ high temperature superconducting magnet energy storage for the power system of NICA complex

Tuesday 16 November 2021 13:15 (20 minutes)

For fluctuation suppression and energy compensation of the power system of the particle accelerators Booster and Nuclotron of NICA complex at JINR, 3 inductively coupled SMES coils are adopted. ASIPP is responsible for one of the three coils with 1 MJ energy storage. The inner diameter of the SMES coil is optimized to be 680 mm. The operating current is about 6 kA level and the pulse period is 4 s. which means that the rate of current changing is about 1.5 kA/s. The maximum magnetic field in the coil region is about 5.1 T. For realizing high safety margin and reducing local performance degradation points caused by manufacturing, the 1MJ SMES coil is composed of multiple identical double pancake coils in series. Each pancake coil is cooled by an individual liquid neon forced flow circuit to guarantee the fluid pressure while all the pancake coils are connected electrically in series. So, the terminal of the superconducting cable is specially designed to realize the separation of cooling and electrical connection. The superconducting cable is helically wound with high-performance thin YBCO tape. For ensuring the bending performance, the spiral angle of each layer is different, which varies from 25-degree to 40-degree. The preparation of the single double pancake coil is underway. The excitation test will be finished in June 2021 to validate the performance.

Primary authors: LI, Ming (Institute of Plasma Physics, Hefei Institutes of Physical Science); ZHENG, Jinxing (Institute of Plasma Physics, Chinese Academy of Sciences); SHENG, Jie (Shanghai Jiao Tong University); KHODZHIBAGIYAN, Hamlet (Joint Institute for Nuclear Research); Dr NOVIKOV, Michael (Joint Institute for Nuclear Research); Prof. LIU, Xufeng (Institute of Plasma Physics, Hefei Institutes of Physical Science, Chinese Academy of Sciences); Dr CHENG, Yuan (Institute of Plasma Physics, Hefei Institutes of Physical Science, Chinese Academy of Sciences); Dr LIU, Haiyang (Institute of Plasma Physics, Hefei Institutes of Physical Science, Chinese Academy of Sciences)

Presenter: LI, Ming (Institute of Plasma Physics, Hefei Institutes of Physical Science)

Session Classification: TUE-PO1-513 SMES, Transformers, Wireless Power Transfer