



Contribution ID: 667

Type: **not specified**

P2.095 Design of the control system of acceleration grid power supply for CFETR N-NBI prototype

Tuesday, 18 September 2018 11:00 (2 hours)

In order to realize the 200keV negative-ion-based neutral beam injector (N-NBI) prototype of China Fusion Engineering Test Reactor (CFETR), an acceleration grid power supply (AGPS) is under development. The AGPS adopts single stage inverter type topology and is rated at 200kV/25A/3600s. Here, the paper presents a control system that can fulfill the high requirements in both steady state and beam modulation state of AGPS performance.

Based on the PCI extensions for instrumentation (PXI) technology, the control system can be well integrated and communicate with upper control system of the N-NBI prototype. The control system is designed to function correctly and reliably in real-time control, supervisory control and protection of AGPS. Furthermore, the control system can also identify the frequent breakdown between acceleration grids and unpredictable beam off correctly within 50 μ s, which correspond to short-circuit of the load and a loss of load respectively. At the same time, simulation verifies that the control strategy can limit the voltage ripple and overshoot, respectively, within the range of $\pm 5\%$ and 15% of nominal outputs.

In addition, a 10kV/6A AGPS prototype has been realized, showing the availability of the control system in terms of operating sequence, control logic, and output adjustment, especially its response to a fault or abnormal conditions of AGPS as well as the breakdown and beam off. Restart operation after breakdown occurring is also tested on the prototype. Thus, the presented control system satisfies the requirements of the 200kV/25A AGPS.

Presenter: MA, Xiao (State Key Laboratory of Advanced Electromagnetic Engineering and Technology School of Electrical and Electronic Engineering Huazhong University of Science Technology)

Session Classification: P2