

Introduction to Space Plasma Environment Research Facility (SPERF) in China

Aohua Mao¹, Xiaogang Wang¹, Peng E¹, Qingmei Xiao¹, Zhibin Wang¹, liyi Li¹

¹ Harbin Institute of Technology, Harbin, China

e-mail (speaker): ahuamao@hit.edu.cn

A new ground-based experimental device, Space Environment Simulation and Research Infrastructure (SESRI), is being constructed at Harbin Institute of Technology (HIT) in China, with the Space Plasma Environment Research Facility (SPERF) is an important component. SPERF aims to provide a unique experimental platform, employing a unique set of coils that are independently programmably energized and the plasma sources, for ground simulation of magnetosphere plasma physics processes. There are three sub-systems in SPERF, Dipole Research EXperiment (DREX), Asymmetric Reconnection EXperiment (AREX), and Tail Reconnection EXperiment (TRES). DREX¹ provides a laboratory platform to simulate radiation belt physics process, e.g., trapping, acceleration/loss, and transport of energetic charged particles, as well as wave excitation and configuration polarization, in a dipole magnetic field relevant to the inner magnetosphere. AREX² provides a unique experimental platform to study the 3D asymmetric reconnection dynamics relevant to the interaction between the interplanetary and magnetospheric plasmas. TRES provides a research platform to understand the physics processes in magnetotail, e.g., the dipolarization front formation and the magnetotail reconnection. Here, we present an overview of the conceptual and engineering designs of SPERF, including the plasma sources³, the plasma diagnostics and the important coils, as well as operation scenarios. The research plan will also be briefly presented.

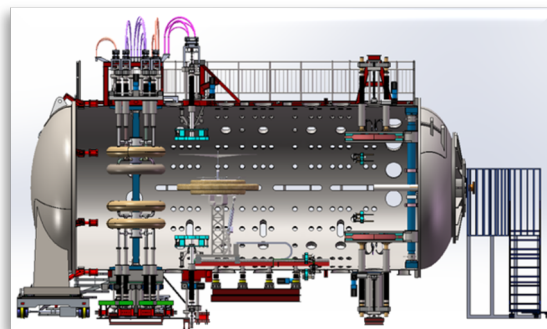


Figure 1. The schematic view of the SPERF device and the coil system under construction at HIT.

References

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