Contribution ID: **224**   Type: **Poster**

Thermal Analysis and Test for the Mockup of ITER Radial X-Ray Camera

Monday, 5 June 2017 13:40 (2 hours)

Radial x-ray camera (RXC) is an important diagnostic device in the International Thermonuclear Experimental Reactor (ITER) tokamak. The function of x-ray camera is to provide a measurement of soft X-ray emission from plasma, which is necessary for the operation and control of plasma to support key physics researches. As a key device to measure the plasma in tokamak, it is required to meet the requirement of working temperature. In order to get the temperature distribution of the RXC in tokamak, the mockup of RXC is fabricated for test. In this paper numerical analysis is performed for the thermal loads on RXC mockup. The finite element model of RXC includes heat exchanger, detector, diagnostics shield module (DSM), cooling pipe, support and vacuum vessel. The heat source of RXC system comes from the high-temperature field of vacuum vessel, which causes temperature rise of RXC through heat conduction and radiation. To keep the RXC system in a reasonable working temperature, an efficient cooling system is designed. In the cooling system, helium is used as cooling medium to cool down RXC system through heat convection. The thermal analysis model combined of heat conduction, radiation and convection is performed for the conjugate heat transfer of RXC system. The analysis result shows a very similar temperature distribution of RXC with the test, which demonstrated the viability and accuracy of analysis method and test process and that present cooling system design meets the temperature requirement of RXC system. All the work done in this paper will provide an important reference for the RXC design.

Eligible for student paper award?

No

Authors: GE, jian (asipp); LU, kun (asipp)

Co-authors: NI, Xiaojun (ASIPP); Mr ZHANG, sheng (asipp)

Presenter: GE, jian (asipp)

Session Classification: M.POS: Poster Session M

Track Classification: Diagnostics and instrumentation