

JT-60SAのプラズマ計測装置開発 Development of Plasma Diagnostics for JT-60SA

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In JT-60SA, plasma diagnostics is essential for evaluation, physics study, and real-time control of the plasma in addition to operation and protection of the tokamak. The diagnostic systems in JT-60SA are classified into three categories: diagnostic systems for “Machine Operation and Protection” such as visible TV, infrared TV, and neutron monitor, diagnostic systems for “Fundamental Parameter Measurement” such as YAG laser Thomson scattering system, CO₂ laser interferometer, and CXRS (charge exchange recombination spectroscopy) system, and diagnostic systems for “Physics Understanding” such as soft X-ray detector, neutron emission profile monitor, and neutral gas pressure gauge. For the diagnostic systems in JT-60SA, components of diagnostic systems used in JT-60U will be reused as much as possible. However, development of the diagnostic systems is required to adapt to the new superconducting tokamak with long-pulse high-power heating and to satisfy needs for new exploration. Especially, most components around the plasma such as the objective optics have to be redesigned. In this paper, recent development of the plasma diagnostics for JT-60SA will be presented.

Figure 1 shows a cutaway view of the horizontal port section for the YAG laser Thomson scattering and CXRS. JT-60SA has the cryostat vessel outside of the vacuum vessel, since it is a superconducting tokamak. And JT-60SA has stabilizing plates inside the

vacuum vessel to obtain high-pressure plasmas. Therefore, to measure the spatial profiles through the aperture of the stabilizing plate, the optics should be located at the end of the long (~2.3 m) port plug. For the Thomson scattering, compact collection optics with high collection efficiency have been designed to be enclosed in the port plug. A wide-angle infrared/visible TV system with a long endoscope has also been designed. The infrared/visible TV system can monitor the main chamber and divertor and it is essential for safety operation of plasmas with long-pulse high-power heating. For divertor observation in plasmas with long-pulse high-power heating, Langmuir probes available under high heat loads have already been manufactured.

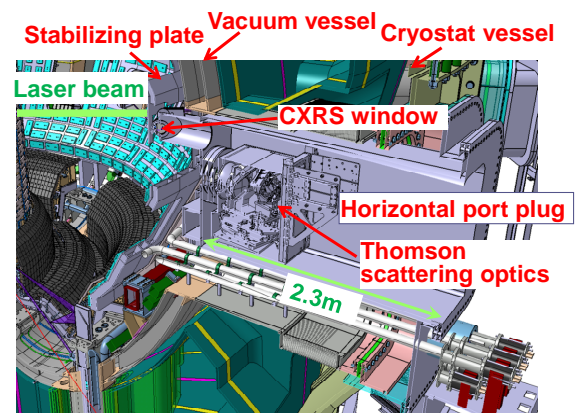


Fig. 1 Cutaway view of horizontal port section for YAG laser Thomson scattering and CXRS.