

6. Japan-Korea Fusion Collaboration Programs

NIFS and National Fusion Research Institute (NFRI) in Korea have been collaborated in several areas on fusion research. Its aim is principally to progress the KSTAR project which first plasma was successfully achieved in 2008. The human resource development program for ITER project and future reactor design work is also an important item of the international collaboration.

I. KSTAR Collaboration

This project consists of collaborations of diagnostic systems and plasma heating systems for KSTAR project which was successfully carried out in 2008.

1 Plasma Heating System

The 4th workshop for Physics of wave heating and current drive was held on Mar 16 – 18, 2009 in NIFS. Technical and theoretical issues were discussed by the participants from universities and institutes.

NIFS continued collaboration and experts exchange for joint development of ICRF long pulse technologies in areas such as transmitter, transmission components and instrumentation & control.

The ECH heating device on KSTAR was an important item to start KSTAR experiment smoothly. Two Japanese ECH experts participated in the startup experiment at KSTAR.

2 Diagnostic Systems

Six NIFS researchers visited NFRI during June, 2008, for the collaboration of diagnostics systems, and NIFS and KSTAR scientists agreed that collaboration activities in diagnostics area should be continued and enhanced.

2-1 Bolometer System

1) Resistive bolometer system

NIFS made a leak test of resistive bolometers at NIFS, and transferred the completed 12 channels resistive bolometer system to KSTAR. The work on design of a divertor resistive bolometer array was begun.

A leak test of resistive bolometers at NFRI was started, KSTAR expert visited NIFS to discuss the foil calibration and the data analysis. NIFS experts visited KSTAR for discussion of installation.

2) Imaging bolometer system

Design work for the periscope, aperture camera, shielding and machine integration is in progress by NIFS and KSTAR including integration design work at NFRI.

NIFS fabricated the foil and performed calibration experiments in 2008. KSTAR experts visited NIFS for 7 days to participate in foil calibration. NIFS expert visited NFRI for 4 days to discuss design and schedule.

Prototype imaging bolometer for KSTAR was designed, installed and tested on JT-60.

2-2 Edge Thomson Scattering System (Polychromators)

Assembly of the optical components inside of the polychromators for KSTAR has been completed. NIFS expert visited KSTAR, and discussed on arrangement of the polychromators and optical fibers in the KSTAR diagnostic room and the expected room temperature variation and the specifications on a temperature control system for the polychromators.

KSTAR expert visited NIFS to calibrate the wavelength dependent sensitivity of polychromators. NIFS expert gave a lecture about Thomson scattering diagnostics including hardware of LHD Thomson scattering system to graduate students in NFRI. NIFS and KSTAR agreed to advance the date of polychromator system's transfer.

2-3 ECE System

Three NIFS experts visited NFRI to discuss interface between a waveguide system prepared at NFRI and the heterodyne radiometer system ($f = 110 - 162$ GHz) under construction at NIFS. Heterodyne receiver for 110-162 GHz has been tested in NIFS.

Multi-channel IF system was fabricated in NIFS. NIFS transferred the completed heterodyne radiometer system ($f = 110 - 162$ GHz) to NFRI after the first plasma operation of KSTAR.

One NIFS expert attended the 17th Topical Conference on High Temperature Plasma Diagnostics held in Albuquerque, New Mexico, and presented the result of this collaboration on KSTAR diagnostics. The title was "Development of Multi-channel System for ECE Radiometer on KSTAR Tokamak".

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II. Human Resource Development

1) Summary of personnel exchanges in FY2008.

The total number of people exchanged from Japan to Korea was 110 and that of from Korea to Japan was 27 respectively.

2) Workshops of various fields were held in each country.

- 4th Japan-Korea Seminar on Advanced Diagnostics for Steady-State Fusion Plasma
- The 4th Workshop on Physics of Wave Heating and Current Drive
- 7th International Conference on Open Magnetic System for Plasma Confinement
- Cross-cutting Approach for Application of Ceramic Matrix Composites to Fusion Reactor
- The Edge Plasmas and Surface Component Interactions in Steady State Fusion Devices
- Blanket Technology and Tritium Behavior in Fusion Reactor
- Theory and Simulation of Magnetic Nuclear Fusion Plasma

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