

## 6. Japan-Korea Fusion Collaboration Programs

NIFS and National Fusion Research Institute (NFRI) in Korea have been collaborated in several areas on fusion research. Main aim was to progress the KSTAR project which first plasma was successfully achieved in 2008 and ICRF and ECH heating experiments were started in 2009. 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 2009.

#### 1. Plasma Heating System

The 5<sup>th</sup> workshop for Physics of Wave Heating and Current Drive was held on Mar 7 – 10, 2010 in NFRI. Technical and theoretical issues were discussed by the participants from universities and institutes.

The 3<sup>rd</sup> workshop for Plasma Heating and Current Drive Systems was held on August 5-7, 2009 in NIFS. Many researchers discussed on various heating systems.

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

#### 2. Diagnostic Systems

Five JA researchers visited NFRI during June, 2009, for the collaboration of diagnostics systems, and JA and KO agreed that collaboration activities in diagnostics area should be continued and enhanced.

##### 2-1 Bolometer System

###### 1) Resistive bolometer system

JA experts visited NFRI to discuss diagnostic collaboration. A 12 channel resistive bolometer system was installed in KSTAR. Data was acquired from bolometers in the 2<sup>nd</sup> experimental campaign. JA expert visited NFRI in November to check operation of amplifiers and detectors and participate in experiments

###### 2) Imaging bolometer system

Design work and fabrication for the periscope, aperture camera, shield and machine integration was carried out by JA and KO including integration design work at NFRI. JA fabricated the foil and performed calibration experiments. A new calibration setup using two dimensional in vacuum motion of foil/frame and UV LEDs was designed and fabricated. JA experts visited NFRI in June, August and November to discuss design and schedule.

##### 2-2 Edge Thomson Scattering System (Polychromators)

Assembly of the optical components inside of the polychromators for KSTAR has been completed. A 25 channel polychromator system was shipped from NIFS to

NFRI in August, and installed in KSTAR. One JA expert visited NFRI in June, and discussed on: (1) arrangement of the polychromators and optical fibers; (2) data acquisition system. Two KO experts visited NIFS in January to participate in density calibration experiments of the LHD Thomson scattering system. One JA expert visited NFRI in March to discuss diagnostic collaboration.

##### 2-3 ECE System

Three JA experts visited NFRI in June to discuss interface between a waveguide system prepared at NFRI and the heterodyne radiometer system ( $f = 110 - 162$  GHz) and absolute calibration of the system. JA expert visited NFRI in August and November to calibrate the system and to participate in experiments. Construction of the multi-channel IF system was continued in JA. JA fabricated the multiplexer for ECE power split used for a new radiometer ( $f=162-196$ GHz). KO upgraded the KSTAR ECE waveguide system with corrugated waveguide.

### II. Human Resource Development

#### 1) Summary of personnel exchanges in FY2009.

The total number of researchers exchanged from Japan universities to Korea was 31 and the researchers from Korea to Japan was 62 respectively.

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

- The 5th Japan-Korea Seminar on Advanced Diagnostics JA and KO agreed to co-organize the 5th Japan-Korea Seminar on advanced diagnostics for steady-state fusion plasma in 2010 in some place in Kyushu island, Japan. The purpose of this seminar is as follows: (1) to give young researchers and students of both Parties a comprehensive knowledge of diagnostics for steady-state fusion plasmas, (2) to give them the opportunity to present their scientific results and (3) to help them to develop international friendships and collaborations.
- The 5<sup>th</sup> Workshop on Physics of Wave Heating and Current Drive was held.
- The 3<sup>rd</sup> workshop for Plasma Heating and Current Drive Systems was held.
- Advanced Technology of Lasers for Understanding of Plasma Physics was held.
- The workshop for Fusion DEMO Reactor and Tritium Safety was held.
- The workshop for Blanket Technology and Tritium Behavior in Fusion Reactor was held.
- The 3<sup>rd</sup> Korea-Japan Workshop on the Edge Plasma and Surface Component Interaction in Steady State Fusion Devices was held.
- The workshop for Fusion Material Engineering Toward Next Generation of Fusion Devices was held.
- The workshop for Theory and Simulation of Magnetic Fusion Plasmas was held.

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