

10. Bidirectional Collaborative Research Program

The bidirectional collaborative research program started in FY2004 as a third collaborative category of NIFS. The purpose of the program is to enforce the activities of nuclear fusion research in universities. The current program involves four major university research centers; Plasma Research Center, University of Tsukuba / Laboratory of Complex Energy Process, Institute of Advanced Energy, Kyoto University / Institute of Laser Engineering, Osaka University / Advanced Fusion Research Center, Research Institute for Applied Mechanics, Kyushu University. In this collaborative program, each research center can have its own collaboration programs using its major facility so that the researchers of other universities can come and join as if the facility belongs to NIFS. It is unique and important that all these activities are supported financially as research subjects of the NIFS bidirectional collaborative research program. The subjects of the bidirectional research program are subscribed from all over Japan every year as one of the three categories of the collaboration research program of NIFS, and the collaboration committee, which is organized under the administrative board of NIFS, adjudicates and selects the subjects.

From FY2010, the second mid-term period started in NINS as well as national universities. In the new mid-term plan, NIFS enounces to promote (1) the pursuit of high performance plasma in LHD, (2) developing of simulation study to build numerical test reactor, and (3) fusion engineering research for the helical DEMO. These objectives are to be attained by enhancing collaborative research. In order to cover the fusion engineering research, two more research institute which have useful facility to promote fusion engineering research are incorporated in the frame work of bidirectional collaborative research program in FY2010. They are the Hydrogen Isotope Research Center (HIRC) of Toyama university for tritium study, and the International Research Center for Nuclear Material Science (IRCNMS), Institute for Material Research, Tohoku university for the study of radiation effect of fusion materials. Six research institutes cooperate with NIFS and share the key issues of research projects of NIFS besides their own research program under the university. It is also recommended that the cooperating program among six research institutes is endorsed.

The topics of this year are;

(1) in the university of Tsukuba, new research program in

which their linear machine GAMMA 10 will be used as a divertor plasma simulator. The maximum flux of 9 MW/m^2 is observed at the mirror throat with 400kW ECH discharge, which is a ITER relevant heat road. They are planning to modify the end-mirror vacuum vessel and install a target assembly and diagnostics,

(2) in a new device in Kyushu University, QUEST which is a normal conducting small spherical tokamak, a maximum toroidal plasma current of 25 kA is achieved by non-inductive current start-up technique. A 10kA discharge is also sustained for 37 s. This is a first target of current experimental stage,

(3) the experimental data of GAMMA10 and QUEST are stored by using the data acquisition system of NIFS (LABCOM/X) via "SNET" which is based on a closed VPN (virtual private network) on Japanese academic internet backbone SINET3. According to the increasing the amount of data, a new "Cloud" technology is prepared for data storage,

(4) behaviors of tritium on the surface is one of the concerns of plasma facing materials. In a new category of HIRC University Toyama, the effects of surface mixing layer on tritium absorption are studied for several material such as tungsten,

(5) another concern of plasma facing materials is a neutron radiation effect on the behavior of tritium and helium in it. In IRCNMS Tohoku university, a Thermal Desorption Spectrometer (TDS) is introduced to study above subject on site for the convenience of collaborators.

In this year, 98 subjects were adopted in this category, among which were 15 at Tsukuba University, 20 at Kyoto University, 20 at Osaka University, 22 at Kyushu University, 11 at Univ. Toyama, 9 at Tohoku Univ. and 1 at NIFS (Activity on all-Japan ST research program). All of these collaborations have been carried out successfully except Tohoku university and Tsukuba university which were suffered from the earthquake of 11th March. Fortunately the damage of the facilities was not large, but it would take a few months for recovery.

Among these subjects, 14 topics from University of Tsukuba, 16 from Kyoto University, 16 from Osaka University, 16 from Kyushu university, 8 from Univ. Toyama, 8 from Tohoku university and 1 from NIFS are reported here.

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