

National Institute for Fusion Science

April 2018 – March 2019





The most inevitable issue for mankind in this century is energy security. Energy resources alternative to fossil fuels are indispensable for a sustainable society, since there is expanding demand for energy on a global scale due to the explosive population growth and economic development concentrated in developing countries. In addition, the increase in greenhouse gases such as carbon dioxide due to the continued use of fossil fuels and the depletion of fuel resources will become serious issues.

The realization of nuclear fusion energy can resolve the serious environmental and energy crisis which humans are now facing. The fuels for fusion can be obtained from seawater, therefore fusion energy is virtually inexhaustible. Furthermore, the fusion reaction does not emit carbon dioxide, thus fusion energy can be the ultimate clean energy. Fusion research around the world has progressed year by year based on the steady progress of basic science and advanced technology. On the other hand, critical scientific and technological issues which must be resolved to put this energy resource in our hands remain.

In order to promote the scientific and engineering research towards the realization of fusion energy, National Institute for Fusion Science (NIFS) conducts three major projects, the Large Helical Device (LHD) Project, the Numerical Simulation Reactor Research Project and the Fusion Engineering Research Project. These three pillars collaborate and stimulate each other to contribute to the progress of the comprehensive fusion science. In addition to the three major projects mentioned above, NIFS also supports interdisciplinary and basic research, and promotes the coordinated research for ITER-BA cooperation, laser cooperation and academic-industrial cooperation.

This annual report summarizes achievements of research activities concerning the fusion research at NIFS from April 2018 to March 2019. NIFS is an inter-university research organization which conducts collaboration research programs under three frameworks, i.e., General Collaboration Research, LHD Collaboration Research and Bilateral Collaboration Research. More than 500 collaborating research topics were proposed by collaborators in universities or institutes across the country. Proposals from abroad were also included.

Finally, I would like to emphasize one more important role of NIFS, the development of human resources. NIFS is pouring energy into education for graduate students who will realize fusion power generation and our society. For this purpose, NIFS provides the advanced education system through the Graduate University for Advanced Studies (Sokendai). Educational collaboration with partner universities across the nation is also conducted by accepting their graduate students to NIFS.

A handwritten signature in black ink, appearing to read 'Y. Takeiri', written over a light blue grid background.

Yasuhiko Takeiri
Director-General
National Institute for Fusion Science