

MERIT Domestic Internship Dispatch

Graduate School of Frontier Sciences
Advanced Materials Science
D3 Uematsu Daisuke

(Duration)

2016.7.25 ~ 9.30

(Host)

TOSHIBA Power and Industrial Systems Research and Development Center

(Objective)

The host division has been developing a compact and portable neutron source to visualize inside the social infrastructure such as bridges or tunnels. The compact neutron source takes advantage of nuclear-fusion reaction of gaseous deuterons in the sealed chamber. To optimize parameter of the prototype, a Monte Carlo simulation code has been developed, which was written in C++. The intern worked on the code development, especially, comparing the simulation with the physics models. In the beginning, the angular distribution of the generated neutron was not isotropic, and the Coulomb interactions between the charged particles had been consuming too much computation resources.

(Activities)

Since this was the first time for the intern to work on the nuclear fusion and C++ programming, the initial stage of the project was to learn these skills. Also, the intern joined an experiment using the prototype neutron source that uses gaseous hydrogen instead of deuteron. Beside the host division in Yokohama, the intern visited Keihin Product Operations and Fuchu Operations and had discussions with other internship students. At Keihin, turbines for hydroelectric plant were being manufactured, and superconducting coil socket was being assembled and qualities of these products were tested. At Chofu, the intern observed manufacturing of electrical boards and demonstration of hydrogen battery system. The intern also visited High Temperature engineering Test Reactor (HTTR) with young employees to study the concept of high temperature gas reactor. The followings are the main work that the intern engaged:

- a) verify cross section,
- b) verify angular distribution of generated neutrons, and
- c) improve algorithm on particle interactions.

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