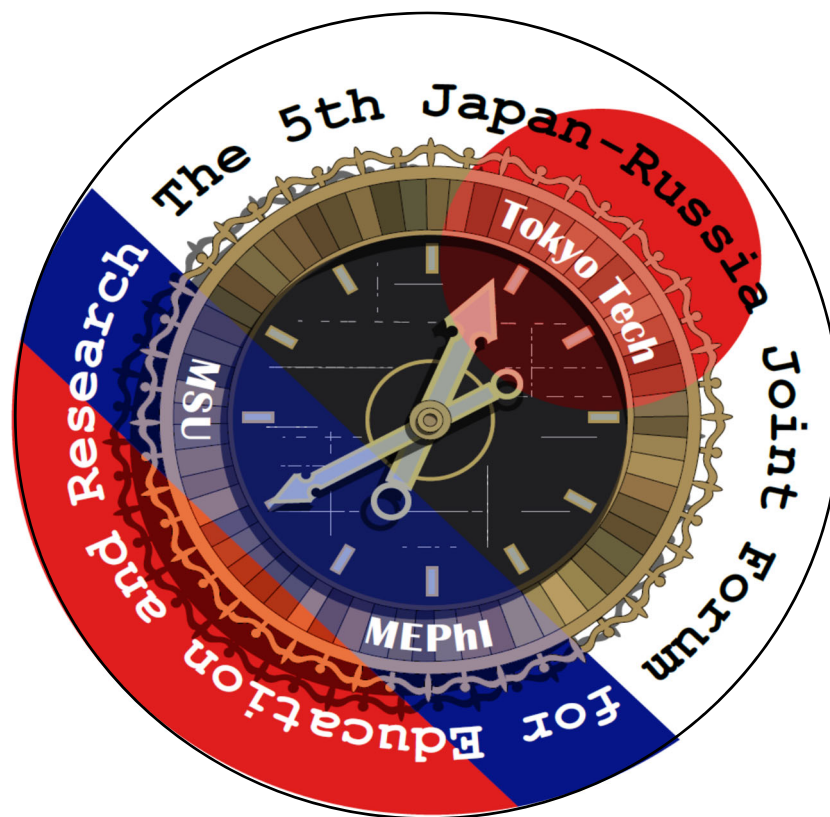Tokyo Institute of Technology Inter-University
Exchange Project with Russia

The 5th Japan-Russia Joint Forum for Education and Research

"Nurturing leader scientists and engineers for Healthcare, medical, nuclear power and energy industries between Japan and Russia."

Date :   October 27(Tue)-28 (Wed), 2020
Time :   Moscow time   10:00 ～ 12:05
             Tokyo time   16:00 ～ 18:05
             The forum is conducted by remote system   (Zoom)

This forum will be held as one of the programs of Inter-University Exchange Project with Russia through academic exchange with Tokyo Institute of Technology (Tokyo Tech), Moscow State University (MSU) and National Research Nuclear University MEPhI (MEPhI).

Normally, the forum is held in conjunction with all three universities in one location. However, this year, due to the influence of COVID-19, the forums will be held separately for Life science and Nuclear Engineering.

This forum in the field of nuclear energy field will be held between MEPhI and Tokyo Tech (as the 5th forum).   And the forum in life science field has been held between MSU and Tokyo tech (The 4th forum) on September 25th.

Program:

October 27 (Tue): Work shop Discussion by Students
16:00 - 18:00 (Tokyo), 10:00 - 12:00 (Moscow)

October 28 (Wed): Plenary Session
(Tokyo) / (Moscow)

16:00 / 10:00   Opening address
    Prof. Obara Toru,
    Lab. for Advanced Nuclear Energy, Tokyo Tech

16:05 / 10:10   Greetings
    Prof. Artisyuk Vladimir,
    Counsellor of The State Atomic Energy Corporation ROSATOM

16:10 / 10:15   Academic lecture

    "Robust nuclear energy system against multiple threats to nuclear safety,
     security and non-proliferation"
    Prof. Sagara Hiroshi,
    Lab. for Advanced Nuclear Energy, Tokyo Tech

    "Simulation of radiation consequences of nuclear accidents"
    Prof. Panin Mikhail,
    Dept. of Radiation Physics and Safety of Nuclear Technology,
    Institute of Nuclear Physics and Engineering, MEPhI

17:10 / 11:10   Lecture by alumni in Japan and Russia
    "What I learned from internship and how I utilize it for the co-creation of
    future"
    Dr. Kawai Kota,
    Radiological Contaminant Management Group Social Safety and
    Industrial Innovation Division Mitsubishi Research Institute, Inc.

    "Internship in Tokyo Tech: experience, practice and enjoyment"
    Ms. Korneva Evgenia,
    Laboratory of incorporated radionuclides, Burnasyan Federal Medical
    Biophysical Center

17:30 / 11:30   Report of student workshop discussion
    (Three teams, 10 min. including Q/A for one team)

18:00 / 12:00   Closing address
                 Prof. Tikhomirov Georgy,
                  Inst. of Nuclear Physics and Engineering, MEPhI

Students' work shop

Participants

Tokyo Tech

Name	School year	Affiliation
Kagayama Yuichi	Master students 1st	Lab. for Advanced Nuclear Energy
Tsuchiya Katsuyoshi	Master students 1st	Lab. for Advanced Nuclear Energy
Fumimoto Taro	Master students 2nd	Lab. for Advanced Nuclear Energy
Kawano Nanako	Master students 1st	Lab. for Advanced Nuclear Energy
Aoyagi Ryo	Master students 2nd	Lab. for Advanced Nuclear Energy
Yamaguchi Saki	Master students 1st	Lab. for Advanced Nuclear Energy

National Research Nuclear University (MEPhI)

Name	School year	Affiliation
Yushin Ilya	Specialist student 5th	Inst. of Nuclear Physics and Engineering
Zaripova Kamilla	Bachelor 4th	Inst. of Nuclear Physics and Engineering
Litvintsova Yuliya	PhD student 2nd	Inst. of Nuclear Physics and Engineering
Kolodin Evgeny	PhD student 3rd	Inst. of Nuclear Physics and Engineering
Salnikov Mikhail	Specialist student 5th	Inst. of Nuclear Physics and Engineering
Egorov Alexander	Master Student 2nd	Inst. of Nuclear Physics and Engineering

Teaming up and Topics for discussion

Team 1

Members: Kagayama Yuichi, Tsuchiya Katsuyoshi (Tokyo Tech)

Yushin Ilya, Zaripova Kamilla (MEPhI)

Topics: What kind of impact can be expected in the operation of nuclear power plants by the COVID-19 pandemic?

Team 2

Members: Fumimoto Taro, Kawano Nanako (Tokyo Tech)

Litvintsova Yuliya, Kolodin Evgeny (MEPhI)

Topics: What is important to get good understanding of nuclear energy by the public?

Team 3

Members: Aoyagi Ryo, Yamaguchi Saki (Tokyo Tech)

Salnikov Mikhail, Egorov Alexander (MEPhI)

Topics: What is needed to proceed the final disposal of high level radioactive waste?

Abstract of Academic lecture

Robust nuclear energy system against multiple threats to nuclear safety, security and non-proliferation

Hiroshi SAGARA

Associate Professor, Dr. Eng.
Laboratory for Advanced Nuclear Energy, Institute of Innovative Research,
Tokyo Institute of Technology

Research Fields, Nuclear non-proliferation science&technology, Multi-physics and multi-events numerical analysis, Nuclear reactor and system design, Nuclear safety security and safeguards

Facing the challenge of multiple threats of global climate change, long-term sustainability and insecurity, nuclear technology is expected as one of the practical and stable solutions to the social demands. Robust nuclear energy system against threats to safety, security and non-proliferation, has been investigated by nuclear fuel and system designing in light water reactors, sustainable and secured actinide management with partitioning and transmutation of minor actinides in Generation IV reactors. For beyond design basis incidents and emergency response, the environmental dynamics of radioactive nuclides and hydro-dynamics analysis for structure material safety are covered.

For non-proliferation science&technology, non-destructive assay technology R&D are being performed to detect the defects and quantify the nuclear material by passive gamma measurement and tomography of spent nuclear fuel, to detect the nuclear material in concealed for by utilizing high energy photon beam application to induce photo-fission neutron signals.

Simulation of radiation consequences of nuclear accidents

Mikhail PANIN

Institute of Nuclear Physics and Engineering, National Research Nuclear University MEPhI
(Moscow Engineering Physics Institute)

In the history of nuclear power there have been several major nuclear and radiation accidents. Mathematical modeling is the most flexible and cheap tool for studying the radiation consequences associated with human exposure and environmental contamination, as well as developing means of responding to possible future accidents. The presentation discusses 3 areas in the framework of accidents impact modeling.

1. Simulating the measurement of radioactive contamination of an area several years after a nuclear accident using gamma-ray spectrometry, taking into account the diffusion of radionuclides into the soil. Comparison of the scattered and non-scattered radiation detected by the detector allows determining the profile of the contamination distribution over the depth and thus gives a correct estimate of the value of surface activity. The Monte Carlo method is used to simulate the radiation field at the detection point and the pulse height spectrum in a high resolution xenon detector.

2. Computational fluid dynamics simulation of accidental emissions diffusion into the atmosphere in complicated conditions: mountainous terrain or superheated release at intense fire of the core.

3. Modeling of acute uneven human radiation exposure in emergency situations using flexible voxel phantoms. Ensuring the flexibility of the phantom to simulate the position of a person at the time of exposure is an independent task, which we solve with the help of free form deformations approach.