Research Institute of Nuclear Engineering
Organizational structure

(2020.7.1)

Director

Vice Director

Department of Nuclear Reactor Physics

Application of reactor physics to research improved safety performance of nuclear power plants and reduction of radioactive waste

- ○Calculation methods for nuclear reactors dedicated to transmutation of long-lived TRU waste
- ○Verification and validation of methods and uncertainty quantification
- ○R&D for multiphysics reactor analysis

Department of Nuclear Reactor Thermal Hydraulics

- ○Understanding of safety-related thermal-hydraulics phenomena through numerical simulation
- ○Development and optimization of safety analysis methods and two-phase flow simulation
- ○Research related to highly reliable plant systems and safety evaluation methods

Department of Nuclear Reactor Fuel and Materials

- ○Development of advanced fuels and accident-tolerant fuels based on fundamental material science
- ○Basic research on corrosion and radiation-induced damage of reactor materials
- ○Contribution to advanced reactor development through thermal and materials science

Department of Nuclear reactor construction systems and decommissioning

In order to increase the safety of nuclear power plants and reduce the environmental burden:

- ○Research on decommissioning of reactors (e.g. "Fugen") and management of radioactive waste and the systemization of related knowledge
- ○Analysis of the impact of earthquakes and tsunami on building constructions
- ○Application of above mentioned knowledge for systematic design

Department of Nuclear Power Disaster Prevention & Risk Management

To push forward nuclear disaster prevention and risk management, and to develop new technology in these areas, we perform research on measures for accident prevention and mitigation, development of nuclear power systems resistant to earthquakes and tsunami, we formulate proposals for accident response measures, optimization of disaster prevention, measures for immediate and effective radiation protection, and work on effective management strategies for radioactive contamination.

- ○Measures for accident prevention and mitigation
- ○Nuclear systems with strong disaster resistance
- ○Optimization of accident and emergency response measures
- ○Justified and immediate radiation prevention and radiation hygiene
- ○Effective disaster management

Department of Nuclear Power Severe Accident Evaluation (Sponsored Research Department)

Department of International Cooperation & Advancement of Human Resource Development

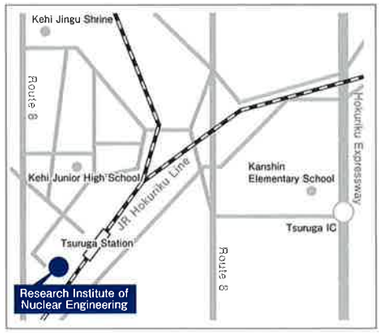
- ○International internships for graduate students
- ○Education and training of international students and researchers
- ○Preparation of educational materials for HRD related to nuclear engineering

Access

Please use public transport when visiting out institute.

By train A 3-minute walk from JR Tsuruga Station

By car 10 minutes from the Hokuriku Expressway Tsuruga IC, heading in the direction of Tsuruga city center



UNIVERSITY OF FUKUI

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UNIVERSITY OF FUKUI

Research Institute of Nuclear Engineering,University of Fukui

A Message from the Director

It's already been more than 10 years since The Research Institute of Nuclear Engineering at the University of Fukui was established. To the present day, on RINE history, we established the Nuclear Disaster Prevention and Risk Management Division in April 2011 in response to the accident at the Fukushima-Daiichi Nuclear Power Plant. We have been performing not only basic and application research in nuclear engineering, but also research on severe accident management measures, earthquake and tsunami, and radiation protection. We also had an opportunity to create a course in Nuclear Safety Engineering for undergraduate students within the Department of Mechanical and Systems Engineering as a result of the reorganization of the School of Engineering at the University of Fukui in 2015. Nuclear energy education at the University of Fukui is concentrated on the Tsuruga campus. Currently, over 100 students are committed to study the nuclear energy field at the Tsuruga campus. Furthermore we are establishing an integrated undergraduate – graduate education path as a result of the reorganization of the Graduate School of Engineering at the University of Fukui in 2020.

Until now and looking forward into the future, we are going to train experts who will become leaders of the future nuclear industry taking into consideration educational research on the decommissioning of the ptototype reactor "Monju",and contribute to a new test reactor which is being considered for construction at the Monju site. We will also contribute to the development of the nuclear industry protection against nuclear and decommissioning in cooperation with the Japan Atomic Energy Agency, universities in the Kansai area and within Fukui prefecture, Technical Colleges, the local governments of Tsuruga-city and Fukui prefecture.

I ask for your continued support and cooperation so that our research institute will make even greater progress and contribute effectively to safe nuclear power in Japan and throughout the world.

Director Masayoshi Uno

Outline of Research and Training at Research Institute of Nuclear Engineering, University of Fukui

Research

- ○ Fundamental and basic research on commercial nuclear reactors through cooperation and collaborative research with nuclear power facilities in Fukui Prefecture
- ○ Active academic exchanges with research institutes in Europe, US and other countries and international research on nuclear power and safety
- ○ Research aiming to improve the safety of nuclear power and enhance disaster prevention and risk management

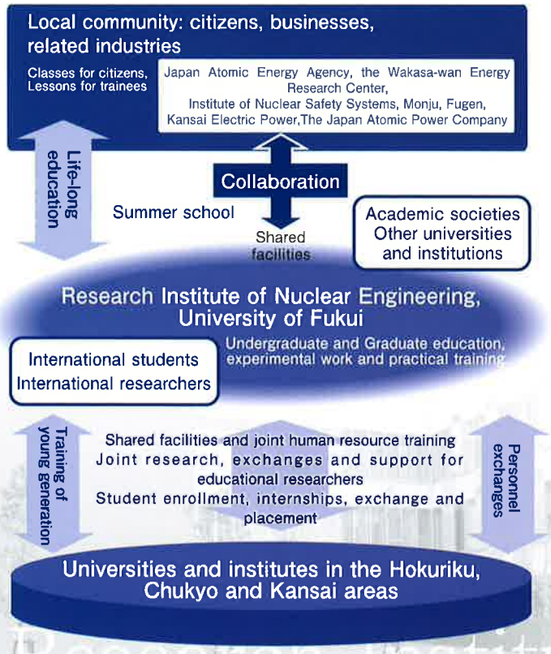
Education

- ○ Undergraduate program of nuclear engineering (Department of Mechanical and System Engineering, Nuclear Power and Energy Safety Engineering Courses)
- ○ Graduate program of nuclear engineering (Nuclear Power and Energy Safety Course)
- ○ Hosting of international students
- ○ Hosting of national and international researchers with the goal of high-level human resource development for nuclear engineering

Collaborations and Hubs

- ○ Collaboration with universitiesand research facilities in our region
- ○ Establishment of a research hub on nuclear facilities
- ○ Collaborations with Wakasa-wan Energy Research Center and other research networks
- ○ Contributions to local community through lectures, seminars, etc.

Research and Educational Environment around the Institute



RINE at a glance

- Staff (as of May 2020)
  · Staff 46

(Full-time academic staff: 8, Specially-appointed professor: 1, Professors for Nuclear Engineering: 6, Administrative staff for Nuclear Engineering: 1, Visiting Professors: 15, Fellowship Researchers: 4, Regional coordinator: 1, Administrative staff: 10)

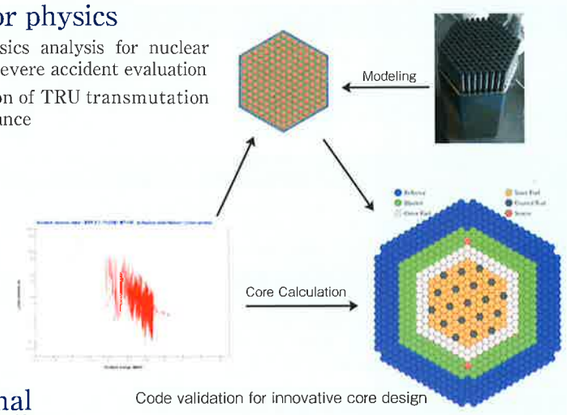
- Education (output in 2019)
  · Promoting the development of nuclear human resources in Japan and overseas as a member of the Nuclear Human Resources Development Network
  · Delivering collaborative online lectures as a member of nation-wide university collaboration network
  · Promoting on-site lectures to the general public in collaboration with Tsuruga City
  · Holding a "Disaster Management Symposium"
  · Nurturing human resources in nuclear power countries (ex: Indonesia, UAE, etc.)
  · Signing of an educational and research exchange agreement with Osaka University (classes start from 2017)
- Research (external funding, 2019)
  · Nuclear system research development program
  · Fukui education research propulsion program (nuclear disaster prevention, risk management)
- Others
  · MoU and agreements with international institutions
  · Alumni employment: Nuclear Regulation Authority, JAEA, Kansai Electric Power, Chubu Electric Power, Tokyo Electric Power Company, The Japan Atomic Power Company, Fukui-prefecture, etc

Research Activities

Research for the safety power plant, prevention disaster, accident managements and radiological consequences by collaborations with basic nuclear engineering

Reactor physics

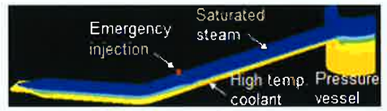
- Multiphysics analysis for nuclear reactor severe accident evaluation
- Evaluation of TRU transmutation performance



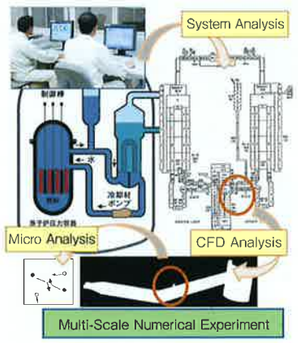
Code validation for innovative core design

Thermal hydraulics

- High-temperature high-pressure two-phase flow phenomena
- Plant behavior under accident conditions
- Coupling of CFD and plant analysis code
- Technological applications of droplets



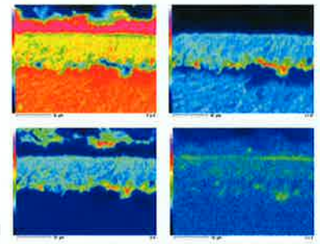
Thermal shock by emergency injection



Multi-scale numerical experiment system

Fuel and materials

- Evaluation of accident-tolerant fuels
- Evaluation of thermal properties under accidental conditions
- Development of model fuels for nuclear waste reduction
- Research of corrosion of nuclear reactor materials
- Fundamental research on material degradation under neutron irradiation in LWR and advanced nuclear reactor systems



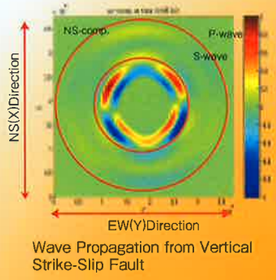
Corrosion behavior of clad

Emergency Preparedness and Response

- Radiation Monitoring
- Disaster prevention system
- Nuclear disaster
- Reconstruction from disaster

Seismic engineering

- Simulation of deformation due to earthquake
- Detection of fault lines with movable array
- Earthquake and tsunami damage prevention



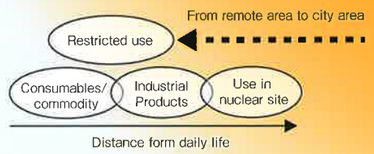
Wave Propagation from Vertical Strike-Slip Fault

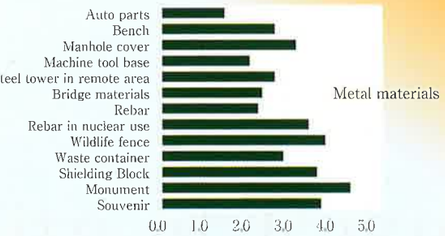
Radiation Research

- Radiation Detection and Measurement
- Fundamental Research on the Radiation
- Effect of Radiation on Living Tissue
- Radiology (Medical use)

Decommissioning and Radioactive Waste Management

- Scenario analysis on decommissioning and radioactive waste management
  - ■Nuclear Power Plant
  - ■Research Reactor
  - ■Fusion Reactor
- Cost evaluation of decommissioning nuclear power plant
- Feasibility study on using clearance materials
- Scenario analysis on radioactive waste management in decommissioning Fukushima Daiichi Nuclear Power Station





Evaluation of feasibility of using clearance materials