



Non-Destructive Testing International Winter School 2016 in Sendai/Japan

Organized by

- *JSPS Core to Core Program (A. Advanced Research Networks)
International Research Core on Smart Layered Materials and Structures for Energy Saving*
- *Innovative Energy Research Center, Institute of Fluid Science, Tohoku University*
- *Tohoku University Fundamental Research and Human Resources Development Program
towards the Decommissioning of Nuclear Power Plants*
- *Japan Society of Maintenology, Tohoku-Hokkaido Chapter*
- *The Japan Society for Non-Destructive Inspection*

Date : March 8th (Tue.) to 15th (Tue.), 2016

Venue : Institute of Fluid Science, Tohoku University

Fee: 60,000 JPY

20,000 JPY (Local students)

Deadline for application: February 12, 2016 (see the attached application form)

“International Research Core on Smart Layered Materials and Structures for Energy Saving” aims at developing a novel form of intelligent structures through the fusion between functional multi-materials and sensing technologies. Within this context we organize an international research team consisting of Tohoku University, Universities in Lyon, Fraunhofer Institute for NDT, Saarland University, Nanjing University of Aeronautics and Astronautics and KTH Royal Institute of Technology, and accelerate the development of smart layered materials and structures for energy saving. Within the context of smart layered materials, materials and structures with integrated sensing functions play a significant role because those will allow a material and structure to monitor its own condition. Hence in that context materials and structures can be used more efficiently not just in terms of their performance but also their endurance, leading to energy savings at very large scales. In this framework and context the 1st Non-Destructive Testing International Winter School was held in Saarbrücken/Germany in 2015 to foster younger researchers who promote research in nondestructive testing and structural health monitoring. The topic there was addressed to monitoring of ageing steel infrastructure and was very much welcomed by the participants originating from countries such as Algeria, Bulgaria, China, France, Germany, India, Indonesia, Iran, Japan, Lebanon, Paraguay, and Taiwan.

This year we focus on nuclear decommissioning at the Fukushima Nuclear Power Plants where we will consider very difficult tasks in extreme environments, and learn and elaborate on how NDT and structural



health monitoring techniques can enhance nuclear decommissioning.

Scope

The NDT Winter School is an international event mainly driven by the following four academic institutions:

- Saarland University, Saarbrücken / Germany
- INSA Lyon / France
- Nanjing University of Aeronautics and Astronautics, Nanjing / China
- Tohoku University, Sendai / Japan

It specifically addresses students at postgraduate level targeting at a master's or doctoral degree. Academic lectures and practical sessions will be provided being related to introduction of nuclear power generation, the current situation of the Fukushima nuclear power station, system safety evaluation, fracture mechanics, robotics as well as an overview on NDT techniques. Along this students will perform a project work in terms of problem-based learning being related to 1) system safety and inspection, 2) robotics and inspection, 3) fracture mechanics and inspection. The winter school will be complemented with an industrial visit to the Tokai Power Station (The Japan Atomic Power Company) under decommissioning and the Japan Atomic Energy Agency, one of the key research institutes for atomic energy in Japan. Social events and a local sightseeing tour will be also held.

Detailed Schedule for NDT Winter School 2016

Tuesday, March 8, 2016

- 15:00 – 16:00 Registration (Meeting Room 203, 1st bldg.)
16:00 – 16:50 Introduction & Orientation (Meeting Room, 1st bldg.)
17:00 – Get Together Party (Multi-purpose Room 202, 1st bldg.)
Greeting by Prof. Takagi

Wednesday, March 9, 2016

- 8:00 – 9:00 Breakfast (Lecture Room, 2nd bldg.)
9:00 – 10:00 Introduction of nuclear power generation (Lecture Room, 2nd bldg.)
10:00 – 10:10 *Coffee Break*
10:10 – 12:10 Current Status and Future of The Fukushima Daiichi Nuclear
Power Station (Lecture Room, 2nd bldg.)
Akio Komori, Tokyo Electric Power Company

12:10 – 13:30 *Lunch*

13:30 – 15:30 Introduction to System Safety Evaluation (Lecture Room, 2nd bldg.)
Hiroshi Ujita, The Canon Institute for Global Studies
15:30 – 15:45 *Coffee Break*
15:45 – 18:00 Safety Evaluation using probabilistic risk/safety
assessment software (Lecture Room, 2nd bldg.)
Seiji Matsumoto, Japan NUS

18:00 – Supper

Thursday, March 10, 2016

- 6:30 – 7:00 Breakfast (Multi-purpose Room, 1st bldg.)

7:00 – 20:00 Scientific tour at Tokai-mura
1. Tokai Power Station (The Japan Atomic Power Company)
2. Japan Atomic Energy Agency (Facility for nuclear fuel, decommissioning)

Friday, March 11, 2016

- 8:00 – 9:00 Breakfast (Lecture Room, 2nd bldg.)
- 9:00 – 9:30 Introduction of JSPS core-to-core program “*International Research Core on Smart Layered Materials and Structures for Energy Saving*”
(Lecture Room, 2nd bldg.)
Toshiyuki Takagi, Tohoku University
- 9:30 – 10:30 Introduction of “*Tohoku University Fundamental Research and Human Resources Development Program towards the Decommissioning of Nuclear Power Plants*” (Lecture Room, 2nd bldg.)
Yutaka Watanabe, Tohoku University
- 10:30 – 10:40 *Coffee Break*
- 10:40 – 12:10 Damage Tolerance and Structural Health Monitoring Options
Christian Boller, Saarland Univeristy
(Lecture Room, 2nd bldg.)
- 12:10 – 13:10 *Lunch*
- 13:10 – 15:30 Project work (Lecture Room, 2nd bldg.)
- 15:40 – 17:10 Health Monitoring for Structured Components and its Application to Reliability Assessment (Lecture Room, 2nd bldg.)
Fumio Kojima, Kobe University
- 18:00 – Banquet (Restaurant “HAGI”)

Saturday, March 12, 2016

One day NDT training

- 9:30 – 10:00 Breakfast (Meeting Room 203, 1st bldg.)
- 10:00 – 10:15 Opening (Meeting Room 203, 1st bldg.)
- 10:20 – 11:20 Overview of Nondestructive Testing Techniques
Tetsuya Uchimoto, Tohoku University
- 11:30 – 12:00 NDT techniques in Industry
1) The Japan Welding Structure College

2) OLYMPUS Corporation

12:00 – 13:05 Lunch

13:05 – 16:40 NDT Training including 15 minute break

(1) Demonstration #1

Reinforcing bar inspection for reinforced concrete

Visualization of temperature distribution by infrared thermography

(2) Demonstration #2

Vibration measurement by vibration strain measuring device

Self-traveling robot for pipe inspection

Practice of hammering test of valves

(3) MT

Fluorescent magnetic particle testing

(4) PT

Water-washable fluorescent penetrant testing

Solvent-based dye penetrant testing

(5) UT

Practice of Ultrasonic thickness gauge and UT flaw detector

Phased array UT flaw detector

(6) RT

Demonstration of pulsed X-ray device

Observation and evaluation of radiography films of weld specimens

Observation of radiography movies of cellular phones

Sunday, March 13, 2016

Cultural tour to Matsushima

Monday, March 14, 2016

8:00 – 8:40 Breakfast

9:30 – 11:30 Robotics for decommissioning in Tohoku University

Yoshito Okada, Tohoku University

(Meeting room, 2nd floor, Research Center for

Rare Metal and Green Innovation)

11:30 – 12:00 Repair technique for decommissioning using cold spray (Lab. Tour)

Kazuhiro Ogawa, Tohoku University

(2nd floor, Research Center for Rare Metal and Green Innovation)

12:30 – 13:30 *Lunch*

13:30 – 15:00 Fracture mechanics and POD analysis of NDT techniques

Gerd Dobmann, Saarland University

15:10 – 16:20 Project short presentation

18:00 – Group party among students

Tuesday, March 15, 2016

Preparation for project presentations

14:30 – 16:45 Project presentation

16:45 – 17:00 Closing ceremony

17:00 – Farewell party