

Final Program

**International Symposium on Symbiotic Nuclear Power Systems
for 21st Century (ISSNP)**

**with Embedded Event of
KNS – AESJ Joint Summer School 2007 on
Advanced Methods of Nuclear Power Plants Operation
& Maintenance for Symbiosis of Technology with
Human
For Students and Young Researchers**

July 9-11, 2007

**Fukui Prefectural Wakasa Wan Energy Research Center,
Tsuruga, Fukui, Japan**

Host organizations:

- Human-Machine System Research Division, AESJ**
- Subtask Group on Advanced Operation & Maintenance Methods for NPP, KOSEF-JSPS Core University Program (CUP) on Energy Science & Technology between Seoul National University and Kyoto University, JSPS**
- Symbio Community Forum**

In cooperation of:

- Human Interface Society**
- Japan Society of Maintenology**
- The Society of Instrument and Control Engineers, Kansai Branch**
- Japan Ergonomic Society, Kansai Branch**
- Center for Risk Management and Safety Sciences, Yokohama National University**
- The Wakasa Wan Energy Research Center**

Supported by:

- The Kansai Electric Power Co., Inc.**
- Fukui Prefecture**
- Tsuruga City**
- Atomic Energy Society of Japan**
- Kansai Research Foundation for Technology Promotion**
- Fukui Convention Visitors Bureau**

Program Day-by-Day :

July 9, 2007

Morning (Only for KNS-AESJ Joint Summer School)

9:00~12:00 Opening ceremony chaired by Prof. T. Fukui (Fukui Univ.)

Chain presentation by all students

Lunch 12:00~13:00

Afternoon

Plenary Session

13:00~13:50 Opening Ceremony chaired by **Prof. H. Yoshikawa (General Chair)**

Welcome Speech by General Chair

Guest Speeches

Mr. I. Nishikawa, Governor, Fukui Prefecture

Mr. K. Kawase, Mayor, Tsuruga City

Dr. H. Shingu, Professor Emeritus Kyoto University,

Director, The Wakasa Wan Energy Research Center

Opening Address by Honorary Chair

Mr. H. Morimoto (Vice President, The Kansai Electric Power Co., Inc.)

14:00~16:30 Plenary Talk chaired by **Prof. E. Matsumoto (Local Organizing Chair)**

Plenary Talk 1: Chairperson: Poong Hyun Seong (Korea Advanced Institute of Science and Technology)

“Governmental System for Science and technology”

Dr. Kenji Oeda,

Deputy Director of Science & Technology Policy, Cabinet Office, Japan

Plenary Talk 2: Chairperson: Zhijian Zhang (Harbin Engineering University)

“The Project of HTR Pebble-bed Module (HTR-PM) and its Technical Consideration”

Professor Zuoyi ZHANG,

Director of Institute of Nuclear & New Energy Technology, Tsinghua University, China

Plenary Talk 3: Chairperson: Morten Lind (Technical University of Denmark)

“MTO (Man-Technology-Organization) Project at OECD Halden”

Dr. Fridtjov Øwre,

Research Director, Institutt for energiteknikk, Halden, Norway

Evening

18:00~20:00 Welcome Reception at Hotel Well Sunpia Tsuruga

July 10, 2007

Morning

9:00~9:50 Keynote Lecture (1) Chairperson: Akio Gofuku (Okayama University)

“Challenges for Instrumentation, Controls, and Human-Machine Interface Technologies in Current and Future Nuclear Power Plants “

Dr. David Holcomb, Oak Ridge National Laboratory


10:00~12:35/13:00 Three Parallel Technical Sessions

Parallel Session A	Operator support systems (3 papers) Advanced control room (3 papers)
Parallel Session B	System simulation technologies (1) (3 papers) System simulation technologies (2) (4 papers)
Parallel Session C	Advanced techniques of NDT (3 papers) Multiple sensors for NDT and prediction of aging effects (3 papers)

Session A

10:00~11:10 Operator support systems

Chairperson: Yoji Takizawa (Toshiba)

Conceptual Design of a Multi-Functional Computerized Decision Support System to Aid Operator's Cognitive Activities 

Seung Jun Lee, Poong Hyun Seong (Korea Advanced Institute of Science and Technology)

Study on Computerized Emergency Operating Procedures for Nuclear Power Plant

Liu Fei, Zhang Zhijian, Peng Minjun (Harbin Engineering University)

Some Insights from the Analysis of Communications of Main Control Room Operators in Nuclear Power Plants

Man Cheol Kim, Jinkyun Park, Wondea Jung (Korea Atomic Energy Research Institute)

11:25~12:35 Advanced control room

Chairperson: Seung-Rohk Oh (Dankook University)

The New Operational Method to Make Better Use of the Computerized Main Control Boards

Kazuo Imai, Kazuaki Nagahashi, Masanori Yokoyama, Masashi Kitamura (The Kansai Electric Power Co., Inc., The Japan Atomic Power Company, Mitsubishi Heavy Industries, Ltd., Mitsubishi Electric Co.)

The Computerized Main Control Board for Full Digital PWR I&C System

Kazuo Imai, Masanori Yokoyama, Masashi Kitamura (The Kansai Electric Power Co., Inc., Mitsubishi Heavy Industries, Ltd, Mitsubishi Electric Co.)

A Novel Approach to Ultra Large Screen Display Design for Operations Centers in the Petroleum Industry

Fridtjov Owre (Institute for Energy Technology)

Session B

10:00~11:10 System simulation technologies (1)

Chairperson: Hiroyasu Mochizuki (Japan Atomic Energy Agency / Fukui University)

Analysis of Steady State Temperature Distribution of HTR-10 with THERMIX-KONVEK Code

Chen Fubing, Dong Yujie, Zhang Zuoyi, Zhou Yangping (Tsinghua University)

Research on Real Time Simulation of Fine Power Distribution

Zhao Bin, Cao Xinrong (Harbin Engineering University)

Numerical Simulation of Flow and Convection Heat Transfer in Vertical Rectangular Narrow Channel

Li Lei, Zhang Zhijian (Harbin Engineering University)

11:25~13:00 System simulation technologies (2)

Chairperson: Yujie Dong (Tsinghua University)

The Improved Design of Emergency Core Cooling System in PCTTRAN-ABWR

Chun-Yu Chen, C. K. Lee, Chunkuan Shih (Taiwan Power Company, Taiwan Power Company, National Tsing Hua University)

Transient Accident Analysis of Vertical Flow Barrage in Plate Type Fuel Elements Based on RELAP5/MOD3.2

Liu Jiange, Peng Minjun (Harbin Engineering University)

Simulation of Thermal-Fluid Behavior in Primary Loop of HTR-PM

Yangping Zhou, Yujie Dong, Mengbai Wu, Shutang Zhu, Yuanle Ma, Fu li (Tsinghua University)

Numerical Simulation for 450 MW Pebble-bed High Temperature Gas-cooled Reactor under Depressurized Loss of Forced Circulation Accident

Weida Yan, Yujie Dong (Tsinghua University)

Session C

10:00~11:10 Advanced techniques of NDT

Chairperson: Toshiyuki Takagi (Tohoku University)

Development of Non-Destructive Testing (NDT) Techniques for Stainless Steel Piping for Instrumentation

Kazuo Imai, Kazufumi Nagashima, Masato Kihira (The Kansai Electric Power Co., Inc, The Kansai Electric Power Co., Inc, Nihon Network Support Co., Ltd.)

Development and Application of a Non-Destructive Testing (NDT) Technique Utilizing Horizontal Shear Waves for Copper Instrument Piping Joints

Kazuo Imai, Kazufumi Nagashima, Hajime Ikeda (The Kansai Electric Power Co., Inc, The Kansai Electric Power Co., Inc, Nihon Network Support Co., Ltd.)

A New Method for Depth Sizing of Complex Shape Cracks Using ECT Signals

Shigeru Kanemoto, Weiyang Cheng, Ichiro Komura (The University of Aizu, Japan Power Engineering and Inspection Co., Japan Power Engineering and Inspection Co.)

11:25~12:35 Multiple sensors for NDT and prediction of aging effects

Chairperson: Shigeru Kanemoto (The University of Aizu)

Development of Depth Measurement Technique for Flaws in Stainless Steel Weld Zones with Twin Matrix Array Ultrasonic Transducers

Hitoshi Ishida, Yasuo Kurozumi, Noboru Fujii (Institute of Nuclear Safety System)

Intelligent Prognostics Methodology for Predicting Aging Effects in Nuclear Systems

Rong Gao, Lefteri H. Tsoukalas (Purdue University)

Evaluation of Crack Sizing Capability of a Novel Combined System of Electromagnetic Acoustic Transducer and Eddy Current Probe

Tetsuya Uchimoto, Toshiyuki Takagi, Toshiaki Ichikawa, Kenichiro Suzuki, Philippe Guy, Amelie Casse (Tohoku University, Tohoku University, Tohoku University, Tohoku University, GEMPPM, INSA-Lyon, GEMPPM, INSA-Lyon)

Lunch 12:35~13:40

July 10, 2007

Afternoon

13:40~14:30 Keynote Lecture(2) Chairperson: Masaharu Kitamura (Tohoku University)

“Proactive Steps to Effective Conduct of an Ethical Engineer”

Dr. Hideaki Nishihara, Professor Emeritus Kyoto University

14:40~17:15/17:40 Three Parallel Technical Sessions

Parallel Session A	Symbiosis of technology - Human reliability analysis and Decision support (4 papers)
Parallel Session B	Diagnostic techniques and hazard analyses (4 papers) Functional modeling (3 papers)
Parallel Session C	Applications of augmented reality and virtual reality (4 papers) Operator training (2 papers)


Session A

14:40~16:15 Symbiosis of technology - Human reliability analysis and Decision support


Chairperson: Tetsuo Sawada (Tokyo Institute of Technology)

Human Error Analysis on Adverse Events that Reported from Japanese Nuclear PowerPlants as Maintenance Errors

Kenichi Takagawa, Takamasa Miyazaki, Akio Gofuku (Institute of Nuclear Safety System, Institute of Nuclear Safety System, Okayama University)

Web Communication Model for the Social Consensus towards HLW Final Disposal 

Akihide Kugo, Hidekazu Yoshikawa, Yasunaga Wakabayashi, Hiroshi Shimoda, Akinobu Uda, Kyoko Ito (Kansai Electric Power, Co. Inc., Kyoto University, Kyoto University, Kyoto University, Kyoto University, Osaka University)

Conductance of Debate and Brainstorming by Means of E-learning for Young Generations to Cope with Social Dilemma of Final Disposal of High-level Radioactive Wastes 

Hidekazu Yoshikawa, Hiroshi Shimoda, Hiroshi Tomie (Kyoto University, Kyoto University, Shiga Prefectural Zeze High School)

Organizational Risk Management Maturity Model and Assessment Tool Designed for High-hazard Industries

Osamu Saito, Takanori Matsui, Tohru Morioka (Osaka University)

Session B

14:40~16:15 Diagnostic techniques and hazard analyses

Chairperson: Jan Eric Larsson (GoalArt)

The Review of Fault Diagnosis Methods for Nuclear Power Plant -The Purpose and Our Research Plan-

Wang He, Yang Ming, Peng Minjun, Cheng Shouyu (Harbin Engineering University)

Real-time HTTR Condition Monitoring with Neural Networks

Kunihiko Nabeshima, Shigeaki Nakagawa, Jun Makino, Kazuhiko Kudo (Japan Atomic Energy Agency, Japan Atomic Energy Agency, Murata Manufacturing Co., Kyushu University)

Human Interface of Distributed Plant Monitoring and Diagnosis System at "Monju"

Manabu Mizuno, Kyoichi Okusa, Kiyoshi Tamayama (NESI, Inc., Japan Atomic Energy Agency, Japan Atomic Energy Agency)

System Level Hazard Analysis by Sequence Tree Method

Hui-Wen Huang, Chunkuan Shih, Swu Yih, Ming-Huei Chen, Shian-Shing Shyu, Jiin-Ming Lin, Chuan-Chung Chen, Chung-Lin Lee, Li-Hsin Wang, Yuan-Chang Yu, Wei-Yi Yang, Wan-Tsz Tu, Hung-Chih Hung, Shu-Chuan Chen (Institute of Nuclear Energy Research / National Tsing-Hua University, National Tsing-Hua University, Ching Yun University, Institute of Nuclear Energy Research, Institute of Nuclear Energy Research, Taiwan Power Company, Taiwan Power Company, Institute of Nuclear Energy Research, Institute of Nuclear Energy Research, Institute of Nuclear Energy Research, National Tsing-Hua University, National Tsing-Hua University, National Tsing-Hua University, National Tsing-Hua University, National Tsing-Hua University)

16:30~17:40 Functional modeling

Chairperson: Hiroshi Shimoda (Kyoto University)

On-line Root Cause Analysis for Nuclear Power Plant Control Rooms

Jan Eric Larsson (GoalArt)

Modeling Nuclear Power Plant with Multilevel Flow Models and its Applications in Reliability Analysis

Yang Ming, Zhang Zhijian, Peng Minjun, Yan Shengyuan (Harbin Engineering University)

The What, Why and How of Functional Modelling

Morten Lind (Technical University of Denmark)

Session C

14:40~16:15 Applications of augmented reality and virtual reality

Chairperson: Yukiharu Ohga (Hitachi)

A Feasibility Study of Decommissioning Support Method by Augmented Reality 


Hiroshi Shimoda, Toshinori Nakai, Hirotake Ishii, Masanori Izumi, Zhiqiang Bian, Yoshinori Kanehira, Yoshitsugu Morishita (Kyoto University, Kyoto University, Kyoto University, Japan Atomic Energy Agency, Kyoto University, Japan Atomic Energy Agency, Japan Atomic Energy Agency)

Virtual Assembly Simulation System of Key Equipments in Nuclear Power Plant

Yan Shengyuan, Zhang Zhijian, Peng Mingjun, Yang Ming, Zhang Hongguo (Harbin Engineering University)

A Tracking Accuracy Guarantee System on Augmented Reality

Zhiqiang Bian, Hirotake Ishii, Hiroshi Shimoda (Kyoto University)

Augmented Reality Applications for Nuclear Power Plant Maintenance Work 

Hirotake Ishii, Zhiqiang Bian, Hidenori Fujino, Tomoki Sekiyama, Toshinori Nakai, Akihisa Okamoto, Hiroshi Shimoda, Masanori Izumi, Yoshinori Kanehira, Yoshitsugu Morishita (Kyoto University, Kyoto University, Kyoto University, Kyoto University, Kyoto University, Kyoto University, Kyoto University, Japan Atomic Energy Agency, Japan Atomic Energy Agency, Japan Atomic Energy Agency)

16:30~17:20 Operator training

Chairperson: Makoto Takahashi (Tohoku University)

Integration of Virtual Stimulation of DCS with NPP Simulator

Chuan-Chung Chen (Taiwan Power Company)

High Quality Education & Training towards Monju Re-Operation

Makoto Sawada, Naoto Sakurai (Japan Atomic Energy Agency)

Evening

18:30~21:00 Conference Banquet at Hotel Well Sunpia Tsuruga

**Banquet Speech by Mr. Akinobu Nozaka, Deputy Director,
Energy R&D Centralization Project Office,
The Wakasa Wan Energy Research Center**

July 11, 2007

Morning

9:00~9:50 Keynote Lecture (3) Chairperson: Kazuo Furuta (The University of Tokyo)

“How can we evaluate man machine interface systems?”

Professor Poong Hyun Seong, Korea Advanced Institute of Science and Technology

10:00~12:35 Three Parallel Technical Sessions

Parallel Session A	Symbiosis of technology -Consideration of economic aspects and safety culture (3 papers) Symbiosis of technology -Risk communication (3 papers)
Parallel Session B	I&C systems (1) (3 papers) I&C systems (2) (3 papers)
Parallel Session C	Psychological and usability evaluation for human-centered system (4 papers)


Session A

10:00~11:10 Symbiosis of technology -Consideration of economic aspects and safety culture

Chairperson: Hiroshi Kimura (The University of Tokyo)

A Study on Optimum Analysis Method for the Multiple Usage of the HTGR from Economic, Energy and Exergy Aspects 

Qi Zhang, Hidekazu Yoshikawa, Hirotake Ishii, Hiroshi Shimoda (Kyoto University)

Empirical Analytical Study on Nuclear Energy Development from the Viewpoint of Evolutionary Economics 

Liu Jingquan, Wang Kan, Hidekazu Yoshikawa (Tsinghua University, Tsinghua University, Kyoto University)

Workplace Activities to Promote Small Attempts for Safety: Toward Development of Safety Culture in a Nuclear Power Plant

Kazuhiro Fukui, Toshio Sugiman (Institute of Nuclear Safety System, Kyoto University)

11:25~12:35 Symbiosis of technology -Risk communication

Chairperson: Kenn'ichi Takano (Keio University)

The Basic Concept of Social Responsibility (SR) of Nuclear Research and Its Practice

Tetsuo Sawada, Akiko Shioda, Naoki Yamano, Yoshiko Aoyama, Junichi Mizuo, Yasuhiko Fujii (Tokyo Institute of Technology)

A Framework of Macroscopic Risk Assessment and Communications of Nuclear Power Plant by International Terrorism Attack

Ryu Ogihara, Yuji Niwa, Atsumi Miyake (Yokohama National University)

Clarification of Knowledge Acquisition Process through Communication on ORCAT System

Hiroshi Kimura, Soichiro Katsumura, Hiroshi Tanaka, Kazuo Furuta (The University of Tokyo)

Session B

10:00~11:10 **I&C systems (1)**

Chairperson: Tadashi Oi (Mitsubishi Electric)

A Development and Testing Strategy for the Real Time Operating Systems of a PLC Processor Module

Young-Jun Lee, Kee-Choon Kwon, Dong-Young Lee, Chang-Hwoi Kim, Han-Seong Son, Eun-Sook Han, Young-Kuk Kim (Korea Atomic Energy Research Institute, Korea Atomic Energy Research Institute, Korea Atomic Energy Research Institute, Korea Atomic Energy Research Institute, Energy & Environment Systems Co., Chungnam National University, Chungnam National University)

Development of OPERASYSTEMTM for the Non-safety I&C System Platform

I. S. Oh, Y. B. Lee, K. H. Kim, Y. H. Gong (Korea Atomic Research Institute, Woori Technology, Korea Nuclear Instrumentation and Control System R&C Center, Korea Nuclear Instrumentation and Control System R&C Center)

Development of an Advanced Power Control System for Nuclear Power Plants


S. M. Kwon, J. M. Lee, C. H. Nam, C. H. Cho, K.H.Kim (Korea Electrotechnology Research Institute, Doosan heavy Industries, Inc., Korea Nuclear Instrumentation and Control System R&D Center)

11:25~12:35 **I&C systems (2)**

Chairperson: Man-Gyun Na (Chosun University)

Security Design of Remote Maintenance System for Nuclear Power Plants based on ISO/IEC 15408

Ryosuke Watabe, Tadashi Oi, Yoshio Endo (Mitsubishi Electric Corp.)

Fault Tree-based Software Safety Analysis of Function Block Diagrams 

Kwang Yong Koh, Poong Hyun Seong (Korea Advanced Institute of Science and Technology)


Establishing New Standards on Application Digital Computer for Safety Systems in Nuclear Power Plants

Susumu Kunito, Kazuo Imai, Junichi Nakashima (Tokyo Electric Power Company, Kansai Electric Power Company, Japan Electric Association)


Session C

10:00~11:35 **Psychological and usability evaluation for human-centered system**


Chairperson: Poong-Hyun Seong (Korea Advanced Institute of Science and Technology)

Attentional Resources effectiveness Measures during Complex Diagnostic Tasks in Nuclear Power Plants 

Jun Su Ha, Poong Hyun Seong (Korea Advanced Institute of Science and Technology)

Experimental Study of Indices for Evaluating the Augmented Reality System from the Viewpoint of Human Centered Design 

Hidenori Fujino, Hirotake Ishii, Hiroshi Shimoda (Kyoto University)


An Experimental Study to Evaluate the Applicability of Displaying Plant Condition Based on MFM Model by Measuring Eye Fixation Points 

Akio Gofuku, Yuji Ishiga (Okayama University)

Development of Integrated Maintenance Support System and its Usability Evaluation 

Makoto Takahashi, Junichi Harada, Toshio Wakabayashi (Tohoku University)

Note:

: Paper by the activity of the Subtask Group on Advanced Operation & Maintenance Methods for NPP, KOSEF-JSPS Core University Program (CUP) on Energy Science & Technology

12:40~ Closing

12:45~13:15 Lunch

Afternoon

Option 1: Bus Tour for JAEA, Tsuruga (13:15~18:00)

(Total number less than 50. Participants of KNS-AESJ Joint Summer School are compulsory.)

- Introduction of Japanese Nuclear R&D Program and Fast Reactor Development**
- Brief Introduction of Monju FBR Plant**
- Sodium Technology Facility**
- In-Service-Test Facility**
- Monju Training Simulator**
- Q&A**

Closing ceremony of KNS-AESJ Joint Summer School

Option 2: Facility Tour of Wakasa Wan Energy Research Center (13:30~14:30)