

Supercomputing in

Monte

Nuclear

Carlo

Applications

SNA+MC2020, Japan <http://snamc2020.jpn.org/>

**Joint International Conference on
Supercomputing in Nuclear Applications + Monte Carlo 2020**

Official Program Book





SNA+MC2020

Joint International Conference on Supercomputing
in Nuclear Applications + Monte Carlo 2020

July 2020

Dear SNA+MC2020 Registrants and Participants,

This is the official program book of the Joint International Conference on Supercomputing in Nuclear Application + Monte Carlo 2020 (SNA+MC2020) which is created by gathering titles of participants.

Supercomputers are useful tools for nuclear science and engineering to carry out massive simulations for design, safety, maintenance, etc. Monte Carlo simulation is one of typical ones which exploit supercomputers. The main topics of SNA+MC2020 are computational nuclear applications, high performance computing and visualization, and Monte Carlo simulation for radiation transport. We prepared special topics of Fukushima recovery & decommissioning issues, virtual reactor and virtual ADS, AI technology for the nuclear field and Monte Carlo simulation for medical and life science. The participants will be interested in these contemporary topics and gain beneficial insights for the future researches.

SNA+MC2020 is hosted by the Computational Science and Engineering Division (CSED) of the Atomic Energy Society of Japan (AESJ). The Organizing Committee has prepared the attractive conference for all the participants from the world with the cooperation of the International Advisory Board, the Local Organizing Committee, and the Technical Program Committee.

Unfortunately, due to the global spreading of COVID-19, it is not possible to host SNA+MC2020 as originally planned for 18-22 May 2020 at Makuhari in Japan. We do not plan to reschedule the meeting itself. However, we have decided to create a proceedings collection as an alternative option for publishing registrants' research.

We wish for early convergence of COVID-19, as well as your health and happiness.

Chair of SNA+MC2020 Organizing Committee

Seiichi Koshizuka



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Atomic Energy Society of Japan



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Session List (1/4)

No.	Name
OPL01	Opening Plenary
CPL01	Closing Plenary

No.	Name
PL01-1	Plenary Session 1
PL01-2	Plenary Session 1
PL02	Plenary Session 2
PL03	Plenary Session 3
PL04	Plenary Session 4

Session List (2/4)

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SNA01	Computational Nuclear Applications: Materials Science (Structural and Functional Materials for Nuclear Application)
SNA01-1	Materials Science I
SNA01-2	Materials Science II
SNA02	Computational Nuclear Applications: Nuclear Reactor Analysis, Thermal Hydraulics and Others (Including SA analysis and CFD applications)
SNA02-1	Nuclear Reactor Analysis, Thermal Hydraulics and Others I
SNA02-2	Nuclear Reactor Analysis, Thermal Hydraulics and Others II
SNA02-3	Nuclear Reactor Analysis, Thermal Hydraulics and Others III
SNA03	Computational Nuclear Applications: Laser/Beam Physics and Their Applications (Related Physics, Chemistry, Biology, and Detector Science)
SNA03-1	Advanced Simulation Studies of Laser/Beam and related biology Issues
SNA03-2	Advanced Computational Methods in Molecular Simulations
SNA03-3	Computational Medical Physics/Radiation Therapy
SNA04	Computational Nuclear Applications: Nuclear Fuel Cycle, Repository Performance (Related to Nuclear Fuels, Reprocessing, and Geological Disposal)
SNA04-1	Advanced Modeling of Nuclear Fuels and Related Reactor Simulation
SNA04-2	Advanced Molecular Modeling of Clay, Zeolite, and Others for Geological Disposal and Related Issues
SNA05	Computational Nuclear Applications: Computational Environmental Analysis (Related to Fukushima Accidents and Others)
SNA05-1	Advanced Simulation Studies for Radio-cesium Transport in River and Dam Systems, Simulation Studies for Radionuclide Transport in the Terrestrial Environment
SNA05-2	Simulation Studies for Radionuclide Transport in Coastal and Ocean Systems
SNA06	Computational Nuclear Applications: Seismic Analysis and Others (Including FEM Analysis)
SNA06-1	Evaluation of extreme external hazard
SNA06-2	Evaluation of structural response to extreme external hazard

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SNA07-1	Visualization and Visual Data Analytics
SNA08	High Performance Computing & Visualization: High Performance Computing (Related to Exascale Computing and others)
SNA08-1	High Performance Computing I
SNA08-2	High Performance Computing II
SNA09	High Performance Computing & Visualization: Advanced CFD Approaches
SNA09-1	Advanced CFD Approaches I
SNA09-2	Advanced CFD Approaches II
SNA10	Fukushima Recovery & Decommissioning Issues
SNA10-1	Computational Studies of Debris Characteristics, Fission Products, and related Issues in Fukushima Decommissioning
SNA10-2	Severe Accident Code Development and Related Issues in Fukushima and Other Accidents
SNA11	AI Technology for the Nuclear Field
SNA11-1	AI Technology for Nuclear Applications: Design, Regulation, and Detection
SNA12	Planned to Poster
SNA12-1	Planned to Poster I

Session List (4/4)

No.	Name
MC01	Monte Carlo Simulation for Radiation Transport: Reactor Physics, Reactor Design, Radiation Shielding/Dosimetry, Accelerator
MC01-1	Reactor Core Analysis
MC01-2	Radiation Shielding/Dosimetry
MC02	Monte Carlo Simulation for Radiation Transport: Nuclear Nonproliferation and Safeguards
MC02-1	Nuclear Nonproliferation/Safeguards/Etc.
MC03	Monte Carlo Methodology (Theory, Algorithms, Methods, Codes):
MC03-1	Monte Carlo Methods General (Statistical Uncertainty/Convergence/Tally/Sampling) I
MC03-2	Monte Carlo Methods General (Statistical Uncertainty/Convergence/Tally/Sampling) II
MC03-3	Monte Carlo Methods for Sensitivity/Perturbation
MC03-4	Monte Carlo Methods for Burnup
MC04	Monte Carlo Methodology (Theory, Algorithms, Methods, Codes): Variance Reduction/Hybrid Methods/Convergence Acceleration
MC04-1	Variance Reduction for Shielding
MC05	Monte Carlo Methodology (Theory, Algorithms, Methods, Codes): Next Generation Monte Carlo Parallelism
MC05-1	GPU
MC05-2	High-Performance Computing/Parallelism
MC06	Monte Carlo Methodology (Theory, Algorithms, Methods, Codes): Dynamic Monte Carlo simulations
MC06-1	Dynamic Monte Carlo Simulations
MC07	Monte Carlo Simulation for Charged/High-Energy Particles
MC07-1	Charged/High-Energy Particles Simulation
MC07-2	Physics Models
MC08	Planned to Poster
MC08-1	Planned to Poster I
MC08-2	Planned to Poster II (invited)

OPL01/CPL01

Opening Plenary/Closing Plenary

Opening Address & Key Note

【Address by the Host Organization Representative】

Seiichi Koshizuka

Chair of SNA+MC2020 Organizing Committee

【Address by the Co-Organization Representative】

Alice Dufresne

OECD Nuclear Energy Agency Data Bank

【Address by the Co-Organization Representative】

Kazumi Aoto

Japan Atomic Energy Agency

【Key Note】

Data Jackets as Communicable Metadata for Potential Innovators

Yukio Ohsawa

The University of Tokyo

Closing Address

【Address by the Host Organization Representative】

Key Ito

Chair of SNA+MC2020 Technical Program Committee, Member of SNA+MC2020 Organizing Committee

【Address by the Next Host Organization Presentative】

to be confirmed

CEA

PL01-04 Plenary Session

PL01

【PL01-1】 invited

The OECD Nuclear Energy Agency Data Bank Computer Program Services: an international centre for the distribution of scientific tools and knowledge for nuclear science and technology

Alice Dufresne^{1*}, Elena Poplavskaia¹, Kenya Suyama¹

1. OECD Nuclear Energy Agency Data Bank

【PL01-2】 invited

Modern and complete nuclear data libraries for nuclear structure and reactions

Arjan Koning^{1*}, Sublet Jean-Christophe¹

1. International Atomic Energy Agency

PL02

【PL02-1】

Monte Carlo Simulations for Medical and Life Sciences

Wesley Bolch^{1*}

1. Department of Biomedical Engineering, University of Florida, Gainesville, FL USA

PL03

【PL03-1】

Simulations for environmental dynamics of oceanic Cs-137 derived from the Fukushima Daiichi Nuclear Power Plant accident

Daisuke Tsumune^{1*}, Takaki Tsubono¹, Kazuhiro Misumi¹, Yutaka Tateda¹

1. Central Research Institute of Electric Power Industry

PL04

【PL04-1】

Role of Numerical Simulation for Fukushima-Daiichi NPP Decommissioning

Koji Okamoto^{1*}

1. Collaborative Laboratory for Advanced Decommissioning Science, Japan Atomic Energy Agency (CLADS/JAEA)

SNA01 Computational Nuclear Applications: Materials Science (Structural and Functional Materials for Nuclear Application)

SNA01-1 Materials Science I

【SNA01-1-1】 3289491

First-principles calculations of dislocation core structure in BCC-HEAs

Tomohito Tsuru^{1*}

1. Japan Atomic Energy Agency / ESISM, Kyoto University / PRESTO, Japan Science and Technology Agency

【SNA01-1-2】 3290936

Simulation of slip plane transition from {110} to {112} of body-centered-cubic metals

Tomoaki Suzudo^{1*}, Takashi Onitsuka², Ken-ichi Fukumoto²

1. Japan Atomic Energy Agency

2. Fukui University

【SNA01-1-3】 3306715 invited

Simulation of defect-dislocation interactions in concentrated solid-solution alloys

Shijun Zhao^{1*}

1. City University of Hong Kong

SNA01-2 Materials Science II

【SNA01-2-1】 3291654

Molecular dynamics study of phosphorus migration in $\Sigma 5$ grain boundary of α -iron

Kenichi Ebihara¹, Tomoaki Suzudo^{1*}

1. Japan Atomic Energy Agency

【SNA01-2-2】 3313318

Molecular simulations to investigate migration and coalescence of He bubbles in iron

Jie Zhan^{1*}, Takao Baba², Sho Hayakawa³, Taira Okita², Mitsuhiro Itakura⁴

1. University of Science and Technology of China / the University of Tokyo

2. the University of Tokyo

3. the University of Tokyo / University of Tennessee

4. Japan Atomic Energy Agency

SNA02 Computational Nuclear Applications: Nuclear Reactor Analysis, Thermal Hydraulics and Others (Including SA analysis and CFD applications)

SNA02-1 Nuclear Reactor Analysis, Thermal Hydraulics and Others I

【SNA02-1-1】 3259096

Verification of a coupling interface for DYN3D and OpenFOAM with a three-dimensional mini-core
Hsingtzu Wu^{1*}, Alexander Grahn², Soeren Kliem²

1. Huazhong University of Science and Technology
2. Helmholtz-Zentrum Dresden-Rossendorf

【SNA02-1-2】 3276378

Validation study of finite element thermal- hydraulics analysis code SPIRAL to a large-scale wire-wrapped fuel assembly at low flow rate condition

Ryuji Yoshikawa^{1*}, Yasutomo Imai², Norihiro Kikuchi¹, Masaaki Tanaka¹, Antoine Gerschenfeld³

1. Japan Atomic Energy Agency
2. NDD Corporation
3. Commissariat à l'énergie atomique et aux énergies alternatives

SNA02-2 Nuclear Reactor Analysis, Thermal Hydraulics and Others II

【SNA02-2-1】 3291740

Core Melt Spreading Simulation by Multi-Physics Particle Method (MPPM) Code

Takeshi Muramoto^{1*}, Kenta Inagaki²

1. Tokyo Institute of Technology
2. Central Research Institute of Electric Power Industry

SNA02-3 Nuclear Reactor Analysis, Thermal Hydraulics and Others III

【SNA02-3-1】 3319945

Building assembly cross-section library for few-group reactor calculation using Monte Carlo method
Zhiyuan Feng^{1*}, Kan Wang¹

1. Tsinghua University

【SNA02-3-2】 3320892

An Investigation on the Control Rod Homogenization Method for Next-Generation Fast Reactor Cores
Kazuo Takino^{1*}, Kazuteru Sugino¹, Shigeo Ohki¹

1. Japan Atomic Energy Agency

SNA03 Computational Nuclear Applications: Laser/Beam Physics and Their Applications (Related Physics, Chemistry, Biology, and Detector Science)

SNA03-1 Computational Medical Physics/Radiation Therapy

【SNA03-1-1】 3320634

Monte Carlo simulation of secondary electrons in water involved in complex DNA damage formation

Takeshi Kai^{1*}, Yusuke Matsuya¹, Tatsuhiko Sato¹

1. Japan Atomic Energy Agency

SNA03-2 Advanced Simulation Studies of Laser/Beam and related biology Issues

【SNA03-2-1】 3321505 invited

The Radiation-Induced Cancer (RIC) Study of the Potential Association of Pediatric CT Exposure and Childhood Cancer: Methods of Patient-Specific Organ Dose Assessment

Wesley Bolch^{1*}, Cameron Kofler¹, Trung Tran¹, Marilyn Kwan², Diana Miglioretti³, Jason Pole⁴,
Rebecca Smith-Bindman⁵

1. University of Florida, Gainesville, FL USA

2. Kaiser Permanente Northern California, Oakland, CA USA

3. University of California, Davis, CA USA

4. Institute for Clinical Evaluative Sciences, Toronto, Ontario, Canada

5. University of California, San Francisco, CA USA

SNA03-3 Advanced Computational Methods in Molecular Simulations

【SNA03-3-1】 3235867

A computational approach for an object situated alone in infinitely expanded radiation field by Monte Carlo codes using reflection boundaries

Takuya Furuta^{1*}, Fumiaki Takahashi¹

1. Japan Atomic Energy Agency

SNA04 Computational Nuclear Applications: Nuclear Fuel Cycle, Repository Performance (Related to Nuclear Fuels, Reprocessing, and Geological Disposal)

SNA04-1 Advanced Modeling of Nuclear Fuels and Related Reactor Simulation

【SNA04-1-1】 3220282

Machine-Learning Molecular Dynamics Study of Thermal Properties of CaF_2

Hiroki Nakamura^{1*}, Masahiko Machida¹

1. Japan Atomic Energy Agency

【SNA04-1-2】 3294033

Benchmarks of burnup and decay heat calculation between MENDEL and MARBLE

Kenji Yokoyama^{1*}, Sébastien Lahaye²

1. Japan Atomic Energy Agency

2. CEA, Paris-Saclay University

【SNA04-1-3】 3320442

Electromagnetic field analysis for the development of the microwave heating equipment capable of uniform heating of a metal nitrate aqueous solution and the metal oxide powder with circular polarization control

Tomoomi Segawa^{1*}, Masafumi Tanigawa¹, Yoshiyuki Kato¹, Koichi Kawaguchi¹, Katsunori Ishii¹, Masahiro Suzuki¹, Toshihide Kitazawa², Tatsuya Kashiwa³

1. Japan Atomic Energy Agency

2. Ritsumeikan University

3. Kitami Institute of Technology

SNA04 Computational Nuclear Applications: Nuclear Fuel Cycle, Repository Performance (Related to Nuclear Fuels, Reprocessing, and Geological Disposal)

SNA04-2 Advanced Molecular Modeling of Clay, Zeolite, and Others for Geological Disposal and Related Issues

【SNA04-2-1】 3293342

Machine Learning Molecular Dynamics Simulations of Clay Minerals and Calcium Silicate Hydrates

Masahiko Okumura^{1*}, Akiko Yamaguchi¹, Keita Kobayashi²

1. Japan Atomic Energy Agency
2. Research Organization for Information Science and Technology

【SNA04-2-2】 3292101

Quantitative evaluation of effects of isomorphic substitutions on delamination energies of clay minerals

Akiko Yamaguchi^{1*}, Ikumi Asano², Yuri Kitagawa², Chenrui Meng³, Atsushi Nakao², Masahiko Okumura¹

1. Center for Computational Science and e-Systems, Japan Atomic Energy Agency, 178-4 Wakashiba, Kashiwa, Chiba 277-0871, Japan
2. Graduate School of Life and Environmental Sciences, Kyoto Prefecture University, Hangi-cho 1-5, Shimogamo, Sakyo-ku, Kyoto 606-8522, Japan
3. Laboratory for Advanced Nuclear Energy, Tokyo Institute of Technology, 2-12-1 Ookayama, Meguro-ku, Tokyo 152-8550, Japan

【SNA04-2-3】 3315847

Evaluation on the crystal structure of ningyoite using XRD analysis and DFT calculation

Chikashi Suzuki^{1*}, Masahiko Osaka¹, Toshio Nakagiri¹

1. Japan Atomic Energy Agency

SNA05 Computational Nuclear Applications: Computational Environmental Analysis (Related to Fukushima Accidents and Others)

SNA05-1 Advanced Simulation Studies for Radio-cesium Transport in River and Dam Systems, Simulation Studies for Radionuclide Transport in the Terrestrial Environment

【SNA05-1-1】 3302941

Applications of Radiocesium Migration Models to Fukushima Environmental Issues (1) Overview

Hiroshi Kurikami^{1*}, Kazuyuki Sakuma¹, Alex Malins¹, Susumu Yamada¹, Masahiko Machida¹

1. Japan Atomic Energy Agency

【SNA05-1-2】 3299508

Applications of Radiocesium Migration Models to Fukushima Environmental Issues (2) Simulation study of relationship between suspended sediment and ¹³⁷Cs concentrations in river water under various rainfalls for irrigation water intake around FDNPP

Kazuyuki Sakuma^{1*}, Hiroshi Kurikami¹, Akihiro Kitamura¹, Kazuki Iijima¹

1. Japan Atomic Energy Agency

【SNA05-1-3】 3317836

Applications of Radiocesium Migration Models to Fukushima Environmental Issues: Numerical analysis of radiocesium transport in temperature-stratified reservoirs by 3D-Sea-SPEC

Susumu Yamada^{1*}, Hiroshi Kurikami¹, Masahiko Machida¹

1. Japan Atomic Energy Agency

【SNA05-1-4】 3299771

Simulation analysis of the Compton-to-peak method for quantifying radiocesium deposition quantities

Alex Malins^{1*}, Kotaro Ochi¹, Masahiko Machida¹, Yukihiisa Sanada¹

1. Japan Atomic Energy Agency

SNA05 Computational Nuclear Applications: Computational Environmental Analysis (Related to Fukushima Accidents and Others)

SNA05-2 Simulation Studies for Radionuclide Transport in Coastal and Ocean Systems

【SNA05-2-1】 3285316

Multi-model ensemble simulation constrained by measurement datasets of atmospheric radioactive cesium released from the Fukushima accident

Daisuke Goto^{1*}, Yu Morino¹, Toshimasa Ohara¹, Tsuyoshi Thomas Sekiyama², Junya Uchida³, Teruyuki Nakajima⁴

1. National Institute for Environmental Studies
2. Meteorological Research Institute
3. Atmosphere and Ocean Research Institute, University of the Tokyo
4. Earth Observation Research Center, Japan Aerospace Exploration Agency

【SNA05-2-2】 3300390

Development of ¹³⁷Cs ad/desorption-diffusion model considering temperature and oxygen condition and application to the ¹³⁷Cs dissolution from bottom sediment in a Fukushima dam reservoir

Hideki Tsuji^{1*}, Hironori Higashi¹, Seiji Hayashi¹

1. National Institute for Environmental Studies

【SNA05-2-3】 3217975

Estimation of air dose rate using measurement results of monitoring posts in Fukushima Prefecture

Akiyuki Seki^{1*}, Akie Mayumi¹, Haruko Murakami Wainwright², Kimiaki Saito¹, Hiroshi Takemiya¹,

Yasuhiro Idomura¹

1. Japan Atomic Energy Agency
2. Lawrence Berkeley National Lab.

SNA06 Computational Nuclear Applications: Seismic Analysis and Others (Including FEM Analysis)

SNA06-1 Evaluation of extreme external hazard

【SNA06-1-1】 3321096

Uncertainty evaluation in fault rupture simulation using parallel finite element method

Yuta Mitsuhashi^{1*}, Hiroshi Okuda², Shanthanu Rajasekharan¹

1. KOZO KEIKAKU ENGINEERING Inc.
2. The University of Tokyo

【SNA06-1-2】 3299658

Reproduction simulation of Large-scale E-Defense shake table test of soil-underground structure

Mahendra Kumar Pal^{1*}, Takuzo Yamashita¹, Shintaro Ohno², Atushi Iizuka³

1. National Research Institute for Earth Science and Disaster Resilience, Japan
2. Kajima Cooperation Pvt. Ltd, Japan
3. Kobe University, Kobe Japan

SNA06 Computational Nuclear Applications: Seismic Analysis and Others (Including FEM Analysis)

SNA06-2 Evaluation of structural response to extreme external hazard

【SNA06-2-1】 3286597

NUMERICAL SIMULATION OF SOIL-PILE-STRUCTURE INTERACTION IN LIQUEFIABLE GROUND IN E-DEFENSE FACILITY

Yuichi Otsuka^{1*}, Yukio Tamari¹, Tsuyoshi Ichimura², Muneo Hori³, Susumu Yasuda⁴

1. Tokyo Electric Power Services Co., Ltd.
2. Earthquake Research Institute / The University of Tokyo
3. Japan Agency for Marine-Earth Science and Technology Research Institute
4. Tokyo Denki University

【SNA06-2-2】 3298187

Reproduction simulation of E-Defense shake-table test of 10-story RC building using detailed finite element model

Takuzo Yamashita^{1*}, Tomoshi Miyamura², Makoto Ohsaki³

1. National Research Institute for Earth Science and Disaster Resilience
2. Nihon University
3. Kyoto University

【SNA06-2-3】 3277251

Seismic Response Analysis of Large-Scale Reinforced Concrete Structures Using High-Fidelity Model

Hiroki Motoyama^{1*}, Muneo Hori²

1. Kagawa University
2. JAMSTEC

【SNA06-2-4】 3321456

Development and application of seismic fragility analysis method for high temperature gas-cooled reactors

Akemi Nishida^{1*}, Tatsuya Itoi², Tsuyoshi Takada², Takenori Hida², Ken Muramatsu¹, Hiroyuki Sato¹

1. Japan Atomic Energy Agency
2. University of the Tokyo

SNA07 High Performance Computing & Visualization: Visualization and Visual Data Analytics

SNA07-1 Visualization and Visual Data Analytics

【SNA07-1-1】 3293284

Interactive In-situ Steering and Visualization of GPU-accelerated simulations using Particle-based Volume Rendering

Takuma Kawamura^{1*}, Yasuhiro Idomura¹

1. Japan Atomic Energy Agency

【SNA07-1-2】 3321247

Intuitive interactions for immersive data exploring of numerical simulation results

Ginga Tabata^{1*}, Naohisa Sakamoto², Takuma Kawamura³

1. Department of Computer Science and System Engineering, Kobe University

2. Graduate School of System Informatics, Kobe University

3. Center for Computational Science and e-Systems, Japan Atomic Energy Agency

【SNA07-1-3】 3300934

Image-Based View Selection for Shape Comparison of Mode Water Regions in Virtual Reality Space

Midori Yano^{1,2*}, Takayuki Itoh², Yuusuke Tanaka³, Daisuke Matsuoka³, Fumiaki Araki³, Tobias Czauderna⁴, Kingsley Stephens⁴

1. Japan Atomic Energy Agency

2. Ochanomizu University

3. Japan Agency for Marine-Earth Science and Technology

4. Monash University

SNA08 High Performance Computing & Visualization: High Performance Computing (Related to Exascale Computing and others)

SNA08-1 High Performance Computing & Visualization: High Performance Computing I

【SNA08-1-1】 3299382

GPU-acceleration of locally mesh allocated two phase flow solver for nuclear reactors

Naoyuki Onodera^{1*}, Yasuhiro Idomura¹, Yussuf Ali¹, Susumu Yamashita¹, Takashi Shimokawabe², Takayuki Aoki³

1. Japan Atomic Energy Agency

2. The University of Tokyo

3. Tokyo Institute of Technology

【SNA08-1-2】 3320346 invited

A Challenge to Analysis of Aircraft Actual Flight conditions by Supercomputer Fugaku

Ryoji Takaki^{1*}, Hisaichi Shibata¹, Yuma Fukushima², Yoshiharu Tamaki², Yuichi Kuya², Seiji Tsutsumi¹, Soshi Kawai²

1. Japan Aerospace Exploration Agency

2. Tohoku University

SNA08-2 High Performance Computing & Visualization: High Performance Computing II

【SNA08-2-1】 3321289

Performance portable implementation of a kinetic plasma simulation mini-app with a higher level abstraction and directives

Yuuichi Asahi^{1*}, Guillaume Latu², Virginie Grandgirard², Julien Bigot³

1. Japan Atomic Energy Agency

2. CEA, IRFM

3. Maison de la Simulation, CEA, CNRS

【SNA08-2-2】 3291988

Communication-avoiding Krylov solvers for extreme scale nuclear CFD simulations

Yasuhiro Idomura^{1*}, Yussuf Ali¹, Naoyuki Onodera¹, Takuya Ina², Toshiyuki Imamura²

1. Japan Atomic Energy Agency

2. Riken

SNA09 High Performance Computing & Visualization: Advanced CFD Approaches

SNA09-1 Advanced CFD Approaches I

【SNA09-1-1】 3324861

Numerical simulation of dynamic interfacial flow by high-precision interface-tracking method

Kei Ito^{1*}, Daisuke Ito¹, Yasushi Saito¹, Toshiki Ezure², Masaaki Tanaka², Takumi Kawamura³

1. Kyoto University
2. Japan Atomic Energy Agency
3. NESI

【SNA09-1-2】 3260796

Development of a Boiling Simulation Method Based on Diffuse Interface Modelling

Akinori Tamura^{1*}, Kenichi Katono¹

1. Hitachi Ltd.

【SNA09-1-3】 3298497

Turbulent Bubbly Flows Simulations using Lattice Boltzmann Methods and Multi-phase Field Model

Yos Panagaman Sitompul^{1*}, Takayuki Aoki¹, Tomohiro Takaki²

1. Tokyo Institute of Technology
2. Kyoto Institute of Technology

SNA09-2 Advanced CFD Approaches II

【SNA09-2-1】 3275776

Ensemble wind simulations using a mesh-refined lattice Boltzmann method on GPU-accelerated systems

Yuta Hasegawa^{1*}, Naoyuki Onodera¹, Yasuhiro Idomura¹

1. Japan Atomic Energy Agency

【SNA09-2-2】 3287863

LES analysis on impact of the forest canopy arrangement on dry deposition

Hiromasa Nakayama^{1*}, Masanao Kadowaki¹, Toshiya Yoshida¹

1. Japan Atomic Energy Agency

【SNA09-2-3】 3290629

Validation of a local-scale high-resolution atmospheric dispersion model with two different boundary conditions for plume dispersion prediction around a nuclear facility

Toshiya Yoshida^{1*}, Hiromasa Nakayama¹, Hiroaki Terada¹

1. Nuclear Science and Engineering Center, Japan Atomic Energy Agency

SNA10 Fukushima Recovery & Decommissioning Issues

SNA10-1 Computational Studies of Debris Characteristics, Fission Products, and related Issues in Fukushima Decommissioning

【SNA10-1-1】 3299320

Estimating fuel weight in molten debris using muon tomography

Tsukasa Sugita^{1*}, Naoto Kume¹, Takuro Fujimaki¹, Kenichi Yoshioka¹, Haruo Miyadera¹

1. Toshiba Energy Systems & Solutions Corporation

【SNA10-1-2】 3291849

Atomistic simulation to estimate liquid surface tension of nuclear materials

Mitsuhiro Itakura^{1*}

1. Japan Atomic Energy Agency

【SNA10-1-3】 3300148

Computational approach to the evaluation of fission product behaviors

Shuhei Miwa^{1*}, Kuniyoshi Nakajima¹, Chikashi Suzuki¹, Rizaal Muhammad¹, Eriko Suzuki¹, Naoki Horiguchi¹, Masahiko Osaka¹

1. Japan Atomic Energy Agency

SNA10-2 Severe Accident Code Development and Related Issues in Fukushima and Other Accidents

【SNA10-2-1】 3317288

Fukushima Daiichi Unit-1 Accident Analysis using SAMPSON/JUPITER coupling simulation: Coupling methodology of system analysis

Chiaki Kino^{1*}, Susumu Yamashita², Hiroyuki Yoshida²

1. The Institute of Applied Energy

2. Japan Atomic Energy Agency

SNA11 AI Technology for the Nuclear Field

SNA11-1 AI Technology for Nuclear Applications: Design, Regulation, and Detection

【SNA11-1-1】 3301032

Feasibility study on prediction of core property of a PWR using deep neural networks

Masahiro Tatsumi^{1*}

1. Nuclear Engineering, Ltd.

【SNA11-1-2】 3319831

MLography: An Automated Quantitative Metallography Model for Impurities Anomaly Detection using Data Mining and Deep Learning

Matan Rusanovsky^{1*}, Ofer Beeri², Gal Oren³

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3. Department of Computer Science, Ben-Gurion University of the Negev, P.O.B. 653, Be'er Sheva, Israel / Department of Physics, Nuclear Research Center-Negev, P.O.B. 9001, Be'er-Sheva, Israel

SNA12 Planned to Poster

SNA12-1 Planned to Poster I (1/2)

【SNA12-1-1】 3316054

Computer simulation for short-term irradiation behavior of mixed oxide fuels containing Am in a fast reactor.

Keisuke Yokoyama^{1*}, Yoshihisa Ikusawa¹, Tomoyuki Uwaba¹, Kyoishi Morimoto¹, Kosuke Tanaka¹, Shun Hirooka¹

1. Japan Atomic Energy Agency

【SNA12-1-2】 3317355

Property representation of PuO₂ and CeO₂ assisted by DFT calculation

Masato Kato^{1*}, Masashi Watanabe¹, Hiroki Nakamura¹, Masahiko Machida¹

1. Japan Atomic Energy Agency

【SNA12-1-3】 3289127

Automatic Design Method of High Reliability Piping using Artificial Intelligence (AI)

Shiro Takahashi^{1*}, Keita Okuyama¹, Shigehiko Kaneko²

1. Hitachi, Ltd.

2. Waseda University

【SNA12-1-4】 3286544

JAEA activities related to the use of computer programs and databases in the nuclear field

Yoshio Suzuki^{1*}, Takayuki Otani¹, Kensuke Sakamoto¹, Masahiro Takakura¹, Yasuhiro Kuwabara²

1. Japan Atomic Energy Agency

2. Research Organization for Information Science and Technology

【SNA12-1-5】 3297050

Specificity of Liquid Metal Embrittlement: first-principles calculations

Masatake Yamaguchi^{1*}

1. Japan Atomic Energy Agency

【SNA12-1-6】 3298566

Numerical simulations on subcooled nucleate pool boiling using interface volume tracking method combined with improved non-empirical boiling and condensation model

Yasuo Ose^{1*}, Tomoaki Kunugi²

1. Yamato System Engineer Co., LTD.

2. Zhejiang University

SNA12 Planned to Poster

SNA12-1 Planned to Poster I (2/2)

【SNA12-1-7】 3315978

Study of shields against D-T neutrons for Prompt Gamma-ray Analysis apparatus in Active-N

Kazuyoshi Furutaka^{1*}, Yosuke Toh¹

1. Japan Atomic Energy Agency

【SNA12-1-8】 3300909

Quantum chemical computational study of radiocesium concentration in forest ecosystems

Hiroya Suno^{1*}, Masahiko Machida¹

1. Japan Atomic Energy Agency

【SNA12-1-9】 3321075

Development and Application of the 3D Air Dose Rate Evaluation System (3D-ADRES)

Minsik Kim^{1*}, Alex Malins¹, Masahiko Machida¹, Kimiaki Saito¹, Yukihiro Hasegawa², Hideaki Yanagi²

1. Japan Atomic Energy Agency

2. Research Organization for Information Science and Technology

【SNA12-1-10】 3432576

A Comparative Study of Sampling Techniques for Dynamic Probabilistic Risk Assessment of Nuclear Power Plants

Kotaro Kubo^{1*}, Xiaoyu Zheng¹, Yoichi Tanaka¹, Hitoshi Tamaki¹, Tomoyuki Sugiyama¹, Sunghyou Jang², Takashi Takata², Akira Yamaguchi²

1. Japan Atomic Energy Agency

2. The University of Tokyo

MC01 Monte Carlo Simulation for Radiation Transport: Reactor Physics, Reactor Design, Radiation Shielding/Dosimetry, Accelerator

MC01-1 Reactor Core Analysis

【MC01-1-1】3288569

Whole-Core Monte Carlo Burnup Calculation for RBWR by Parallel Computing

Junichi Miwa^{1*}, Tetsushi Hino¹, Takeshi Mitsuyasu¹, Yasuyuki Nagaya²

1. Hitachi, Ltd., R&D group

2. Japan Atomic Energy Agency

MC02 Monte Carlo Simulation for Radiation Transport: Nuclear Nonproliferation and Safeguards

MC02-1 Nuclear Nonproliferation/Safeguards/Etc.

【MC02-1-1】 3287982

A negative probability table problem of heating number in FENDL-3.1d ACE file

Chikara Konno^{1*}, Saerom Kwon²

1. Japan Atomic Energy Agency

2. National Institutes for Quantum and Radiological Science and Technology

【MC02-1-2】 3285167

Geometry effects in MCNPX-PoliMi simulation of a cube-shaped, monolithic neutron scatter camera

Taylor Harvey^{1*}, Andreas Enqvist¹

1. University of Florida

MC03 Monte Carlo Methodology (Theory, Algorithms, Methods, Codes):

MC03-1 Monte Carlo Methods General (Statistical Uncertainty/Convergence/Tally/Sampling) I

【MC03-1-1】 3195646

Stochastic temperature interpolation in the Monte Carlo code TRIPOLI-4®

Odile Petit^{1*}, Cédric Jouanne¹

1. CEA, Paris-Saclay University

【MC03-1-2】 3253953

Estimation method of systematic uncertainty associated with uncertainty of total cross section model in PHITS

Shintaro Hashimoto^{1*}, Tatsuhiko Sato¹

1. Japan atomic energy agency

MC03-2 Monte Carlo Methods General (Statistical Uncertainty/Convergence/Tally/Sampling) II

【MC03-2-1】 3291377

Sample Mean Convergence Detection of Monte Carlo Tallies under Autocorrelation

Taro Ueki^{1*}

1. Japan Atomic Energy Agency

MC03 Monte Carlo Methodology (Theory, Algorithms, Methods, Codes):

MC03-3 Monte Carlo Methods for Sensitivity/Perturbation

【MC03-3-1】 3237062

Development of differential operator method for generalized response sensitivity analysis

Guanlin Shi^{1*}, Conglong Jia¹, Kan Wang¹, Kaiwen Li¹, Quan Cheng¹

1. Tsinghua University

【MC03-3-2】 3300857

Understanding uncertainties in PWR neutronics through sensitivity analysis and its convergence:
application to power distributions

Pamela Alejandra Lopez^{1*}, Adrien Bidaud¹, Davide Portinari²

1. LPSC, Universite Grenoble-Alpes, CNRS/IN2P3 53, rue des Martyrs, Grenoble, France

2. Institut Laue-Langevin (ILL), 71 Avenue des Martyrs, Grenoble, France

MC03-4 Monte Carlo Methods for Burnup

【MC03-4-1】 3238578

Development of a Monte Carlo based code system for CANDU burning analysis

Hoang Hai Nguyen^{1*}, Jun Nishiyama¹, Toru Obara¹

1. Laboratory for Advanced Nuclear Energy, Institute of Innovative Research, Tokyo Institute of Technology

MC04 Monte Carlo Methodology
(Theory, Algorithms, Methods, Codes):
Variance Reduction/Hybrid Methods/Convergence Acceleration

MC04-1 Variance Reduction for Shielding

【MC04-1-1】 3316936

Assessment of the Lagrange Discrete Ordinates Equations for Monte Carlo Variance Reduction Parameter Generation

Kelly L. Rowland^{1*}, Cory D. Ahrens², Steven Hamilton³, R. N. Slaybaugh⁴

1. National Energy Research Scientific Computing Center (NERSC)
2. Primary Physics Group, X Theoretical Design Division, Los Alamos National Laboratory
3. Radiation Transport Group, Oak Ridge National Laboratory
4. Nuclear Engineering Department, University of California, Berkeley

MC05 Monte Carlo Methodology (Theory, Algorithms, Methods, Codes): Next Generation Monte Carlo Parallelism

MC05-1 GPU

【MC05-1-1】 3203433

Algorithms and Performance of GPU-Based Continuous Energy Monte Carlo Code PRAGMA

Namjae Choi^{1*}, Kyung Min Kim¹, Jae Uk Im¹, Han Gyu Joo¹

1. Seoul National University

MC05-2 High-Performance Computing/Parallelism

【MC05-2-1】 3325321

Performance Portability Analysis of Different Programming Models for High Performance Monte Carlo Neutron Transport

Tao Chang^{1*}, Emeric Brun², Christophe CALVIN³

1. DEN-Service d'Etudes des Réacteurs et de Mathématiques Appliquées (SERMA) / Maison de la Simulation / Université Paris-Saclay

2. DEN-Service d'Etudes des Réacteurs et de Mathématiques Appliquées (SERMA)

3. CEA DRF / Maison de la Simulation

MC06 Monte Carlo Methodology
(Theory, Algorithms, Methods, Codes):
Dynamic Monte Carlo simulations

MC06-1 Dynamic Monte Carlo Simulations

【MC06-1-1】 3297913

First of a Kind Quasi-static kinetic Monte Carlo simulations with Nuclear Data Uncertainty Quantifications
Shihang Jiang^{1*}, Alexander Vasiliev², Hakim Ferroukhi², Alexandre Dimitri Rochman², Mathieu Hursin²,
Alvaro Garcia Bernal

1. Department of Engineering Physics, Tsinghua University, China

2. Laboratory for Reactor Physics and Thermal-Hydraulics, Paul Scherrer Institut, Switzerland

MC07 Monte Carlo Simulation for Charged/High-Energy Particles

MC07-1 Charged/High-Energy Particles Simulation

【MC07-1-1】 3224380

Assessment of MCNP6 and PHITS-predicted secondary neutron yields from experimentally emulated galactic cosmic ray interactions

Hunter N. Ratliff^{1*}, Natalie A. McGirl², Luis A. Castellanos², Hui-Chen Wang², Ashwin P. Srikrishna², Lawrence H. Heilbronn²

1. The University of Tennessee, Knoxville / Japan Atomic Energy Agency
2. The University of Tennessee, Knoxville

【MC07-1-2】 3296512

Implementation of muon pair production in PHITS

Yasuhito Sakaki^{1*}

1. KEK

MC07-2 Physics Models

【MC07-2-1】 3273702

Finite-dimensional representation of infinite-dimensional dynamical systems

Yoritaka Iwata^{1*}, Yasuhiro Takei²

1. Kansai University
2. Mizuho Information & Research Institute

【MC07-2-2】 3287722

Extension of fission reaction model FIFRELIN for wider reaction conditions and post processing

Tatsuhiko Ogawa^{1*}, Olivier Litaize², Davide Mancusi², Abdelhazize Chebboubi², Olivier Serot²

1. Japan Atomic Energy Agency / Commissariat à l'énergie atomique et aux énergies alternatives
2. Commissariat à l'énergie atomique et aux énergies alternatives

MC08 Planned to Poster

MC08-1 Planned to Poster I

【MC08-1-1】 3299941

Full core burnup calculation of the HTTR by Monte-Carlo code MVP

Reiji Ikeda^{1*}, Hai Quan Ho², Nozomu Fujimoto³, Shimpei Hamamoto², Satoru Nagasumi², Toshiaki Ishii², Etsuo Ishitsuka²

1. Graduate School of Engineering, Kyushu University
2. Japan Atomic Energy Agency
3. Kyushu University

【MC08-1-2】 3321280

Validation of the PHITS code by 1MW beam operation at J-PARC spallation neutron source

Masahide Harada^{1*}, Kenichi Oikawa¹, Shin-ichiro Meigo¹, Motoki Ooi¹, Hiroshi Takada¹, Katsuhiko Haga¹

1. Japan Atomic Energy Agency

【MC08-1-3】 3324551

Preliminary implementation of adjoint-weighted tally capability in Solomon solver

Delgersaikhan Tuya^{1*}, Yasunobu Nagaya¹

1. Japan Atomic Energy Agency

MC08 Planned to Poster

MC08-2 Planned to Poster II (invited)

【MC08-2-1】 3291277 invited

Current status and application of EGS5 code

Yoshihito Namito^{1*}

1. KEK

【MC08-2-2】 3305432 invited

Main and Recent Unique Capabilities of RMC Code

Kan Wang¹, Xiaoyu Guo^{1*}, Kaiwen Li¹, Shanfang Huang¹, Xiaotong Shang¹, Guanlin Shi¹, Shichang Liu¹, Yuan Yuan¹, Zhiyuan Feng¹, Qingquan Pan¹, Hao Li¹

1. Tsinghua University

【MC08-2-3】 3328231 invited

MVP: A General-Purpose Monte Carlo Code for Continuous-Energy Neutron and Photon Transport Calculations, Version 3

Yasunobu Nagaya^{1*}

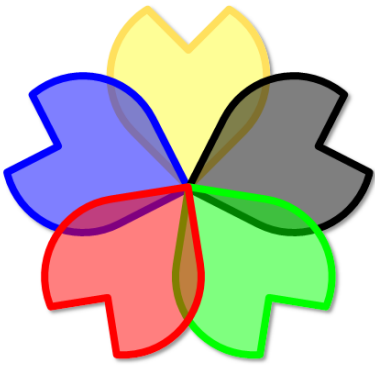
1. Japan Atomic Energy Agency

【MC08-2-4】 3328284 invited

Particle and Heavy Ion Transport code System: PHITS

Tatsuhiko Sato^{1*}, Yosuke Iwamoto¹, Shintaro Hashimoto¹, Tatsuhiko Ogawa¹, Takuya Furuta¹, Shin-ichiro Abe¹, Takeshi Kai¹, Pi-En Tsai¹, Norihiro Matsuda¹, Yusuke Matsuya¹, Hunter Ratliff¹, Hiroshi Iwase², Nobuhiro Shigyo³, Lembit Sihver⁴, Koji Niita⁵

1. Japan Atomic Energy Agency
2. High Energy Accelerator Research Organization
3. Kyushu University
4. Technische Universitat Wien
5. Research Organization for Information Science and Technology



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