NUCLEAR MODELLING 2022

5th Annual Modelling in Nuclear Science and Engineering Seminar

Room G41, Department of Earth Science and Engineering, Royal School of Mines, Imperial College London, Prince Consort Road, London SW7 2BP

PROGRAMME

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DAY 1   THURSDAY 7 APRIL

9:00   REGISTRATION, NETWORKING AND REFRESHMENTS

9:35   **Opening and Welcome**
Prof. Omar Matar, Head of Department of Chemical Engineering, Imperial College London

SESSION 1: FUEL & PROCESS MODELLING AND STRUCTURAL INTEGRITY
*Chair: **Prof. Ali Tehrani***

09:45   **Validation of modelling and simulation: Linking Data, Methods and Needs**
***Dr Tatiana Ivanova**, Head of Division of Nuclear Science, OECD Nuclear Energy Agency*

10:10   **Safe Cracking: Monte Carlo Nonlinear Coupled Analysis of Nuclear Reactor Bricks**
***Rebecca Newsom**, Quintessa Ltd.*

10:30   **Nuclear Derived Hydrogen – Production Methods**
***Christopher Connolly**, National Nuclear Laboratory (NNL).*

10:50   **Stress Analysis Modelling of Cracked AGR Graphite Moderator Bricks**
***Dr Ahmadreza Farrokhnia**, The University of Manchester*

11:10   **Modelling Grain Boundaries in Nuclear Fuel Materials**
***Dr Simon Middleburgh**, Bangor University*

11:30   **A Monolithic Fluid-Structure Interaction Solver Towards Full-Spectrum Simulation of Flow-Induced Vibration**
***Linfeng Li**, Imperial College London*

11:50   **Peridynamic Modelling of Cracking in TRISO Particles for High Temperature Nuclear Reactors**
***Dr Thomas Haynes**, University of East Anglia*

12:10   LUNCH, NETWORKING AND POSTERS

SESSION 2: PLANT PERFORMANCE AND NUCLEAR SAFETY
*Chair: **Prof. Paul Smith***

13:15   **An Overview of UK Programmes and the Requirements for Modelling and Model Development**
***Dr Paul Nevitt**, National Nuclear Laboratory (NNL)*

13:40   **Performance of Cr-Coated Cladding in LOCA**
***Dr John Jones**, Fairlie Associates*

14:00   **Insights on Safety Analyses Modelling Development and Research Needs for Light Water SMR**
***Dr Fulvio Mascari**, ENEA*

14:20   **Usage of Numerical Simulations in the Field of Severe Accident by Framatome**
***Dr Matthias Braun**, Framatome GmbH*

14:40   **Integrated Risk Management and Visualisation Software for a Nuclear Reactor**
***Marinos Panayiotou**, Corporate Risk Associates*

15:00   **Development of a Gamma Ray Dose Rate Calculation and Mapping Tool for Lagrangian Marine Nuclear Emergency Response Models**
***Andrew Little**, Ministry of Defence / Imperial College London*

15:20   BREAK AND POSTERS

DAY 1 THURSDAY 7 APRIL

DAY 2 FRIDAY 8 APRIL

SESSION 3: REACTOR PHYSICS, RADIATION TRANSPORT AND THERMAL HYDRAULICS: PART 1
*Chair: **Dr Andrew Buchan***

15:55 **Sustainability of Reactor Modelling and Analysis in the UK**
Prof. Eugene Shwageraus, *University of Cambridge*

16:20 **Adaptivity and Iterative Methods for Boltzmann Transport**
Dr Steven Dargaville, *Imperial College London*

16:40 **Framatome Toolkit for Radiation Transport Applications**

Efficient Multi-Purpose Digital Workflow for Radiation Transport
Dr Louis Sgandurra, *Framatome*

17:00 **Multiple Gas-Liquid Flow Regime Computational Modelling for Nuclear Thermal Hydraulics**
Dr Marco Colombo, *University of Sheffield*

17:20 **Goal-based a Posteriori Error Estimates for Neutron Transport in the Presence of Discontinuities**
Ioannis Nikiteas, *Imperial College London*

17:40 **Localised Reduced Order Modelling of the Angular Dimension of the Boltzmann Transport Equation using Proper Orthogonal Decomposition**
Alex Hughes, *Queen Mary University of London*

18:00 **DAY 1 CLOSES**

SESSION 4: REACTOR PHYSICS, RADIATION TRANSPORT AND THERMAL HYDRAULICS: PART 2
*Chair: **Prof. Panagiota Angeli***

09:35 **Thermal Hydraulics Research Relevant to Current and Next Generation Nuclear Reactors**
Prof. Shuisheng He, *University of Sheffield*

10:00 **An Autoencoder-based Reduced-Order Model with Domain Decomposition Applied to Neutronics in Reactor Physics**
Toby Phillips, *Imperial College London*

10:20 **WIMS and MONK Modelling of the NuScale SMR on the MCSAFER Project**
Magda Stefanowska, *Jacobs*

10:40 **Modelling Flows in Nuclear Fuel Rod Bundles using Automatic Code Generation**
Kene Nwegbu, *Imperial College London*

11:00 **BREAK**

SESSION 5: APPLICATION OF MULTIPHYSICS, THERMAL HYDRAULICS AND WASTE
*Chair: **Dr Simon Middleburgh***

11:15 **Data Learning: Integrating Data Assimilation and Machine Learning for reliable AI Models**
Dr Rossella Arcucci, *Imperial College London*

11:40 **Progress with the THOR Rig – Installation and Commissioning**
Dr Marcus Dahlfors, *Bangor University*

DAY 2 FRIDAY 8 APRIL

12:00 **Modelling of Intensified Extraction Separations for Spent Nuclear Fuel Reprocessing**
Prof. Panagiota Angeli, University College London

12:20 **Design of Micro-Analytic Detector System for Nuclear Waste**
Dr Miguel Pineda, University College London

12:40 **Project FAITH Fuel Assembly Incorporating Thermal Hydraulics-off-site Modular Manufacture Digital Twin for Fast Reactor Experiments**
Dr Mark Bankhead, National Nuclear Laboratory (NNL)

13:00 **LUNCH AND NETWORKING**

SESSION 6: APPLICATION OF NUCLEAR MODELLING TO SIMULATION OF COVID-19 TRANSMISSION
Chair: Dr Amir Nourian

14:00 **Understanding and Mitigating COVID-19 Transmission using Nuclear Modelling Methods – PART 1**
Prof. Christopher Pain, *Prof. Paul Smith*, and *Prof. Ali Tehrani*, Applied Modelling and Computation Group, Imperial College London

14:20 **PART 2**
Prof. Paul Smith, *Prof. Christopher Pain*, and *Prof. Ali Tehrani*, Applied Modelling and Computation Group, Imperial College London

14:40 **Data-driven Modelling of Covid-19 Transmission Risk in Schools**
Boyang Chen, Imperial College London

15:00 **A Multi-Physics Model for the Prediction of Coronavirus Inactivation in Populated Rooms using 222 nm Far-UVC**
Dr Andrew Buchan, Queen Mary University of London

15:20 **CLOSING REMARKS**
Prof. Christopher Pain

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