computers (40 min)
(This presentation explains the design of supercomputers, and delivers practical advises on setting up the supercomputers for MCNP and SERPENT calculations of nuclear reactors. Results of calculations performed on supercomputers are demonstrated.)

12:30 - 13:45: Lunch

13:45 –14:15, **Jaakko Leppänen**, VTT
Stochastic implicit Euler based MC burnup scheme in SERPENT (30 min)
(The SIE based scheme, developed within HPMC, was implemented into the SERPENT code. This presentation gives practical advises on how this scheme can be used in SERPENT, and compares results achieved with this and conventional scheme.)

Hotel info

The following hotels in Stockholm are recommend:

Hotel Birger Jarl
Tulegatan 8, Vasastan, 104 32 Stockholm
Email: `info@birgerjarl.se`
Home page: `www.birgerjarl.se`

Elite Palace Hotel
Sankt Eriksgatan 115, 113 43 Stockholm
Email: `info.palace@elite.se`
Home page: `www.elite.se/eng/hotell/stockholm/palace`

Elite Hotel Arcadia
Körsbärsvägen 1, 114 23 Stockholm
Tel. +46 8-566 215 00
Fax +46 8-566 215 01
Email: `info.arcadia@elite.se`

Web page

Information about the HPMC project and this seminar can be obtained from the project web page
`http://www.fp7-hpmc.eu/`

Registration

Email the following information to Jan Dufek `<jandufek@kth.se>` before June 1st, 2014:

- First Name
- Last Name
- Organisation/Affiliation
- Address
- Phone
- Fax
- Email

HPMC Training Seminar

KTH Royal Institute of Technology

June 4 – June 5, 2014

Overview

The EU FP7 High Performance Monte Carlo reactor core analysis project (HPMC) has been set up to develop and promote advanced high-performance Monte Carlo simulations of nuclear reactors. The project covers development of new methods for:

- coupled Monte Carlo - thermal–hydraulic calculations,
- Monte Carlo burnup calculations,
- kinetic Monte Carlo calculations,
- parallel Monte Carlo calculations.

As the project is in its final year, the methods and codes developed within the project are ready to be presented to the industry and academia. This seminar is thus an integral part of the project.

Aim of the seminar

The problems that have been solved within HPMC are often not well known to users of Monte Carlo codes. The aim of this seminar is to explain and demonstrate the problems of the existing Monte Carlo burnup codes as well as the problems of the common schemes coupling Monte Carlo and thermal–hydraulic solvers.

The HPMC project gives solutions to the above problems; these solutions will be explained and demonstrated. As the new methods have been implemented in the MCNP and SERPENT codes, several sessions are set up for you to become familiar with the new code features.

Place

The seminar will be held at the Nuclear Reactor Technology division (NRT) at KTH, AlbaNova building, Rooms FA31 (June 4) and FB51 (June 5)

Address:
Roslagstullsbacken 21
106 91 Stockholm, Sweden

Speakers

- **Victor Hugo Sanchez-Espinoza**, Head of the Reactor Physics and Dynamics group at the Institute for Neutron Physics and Reactor Technology (INR), Karlsruhe Institute of Technology (KIT), Germany;
- **J. Eduard Hoogenboom**, Director of the Delft Nuclear Consultancy (DNC), The Netherlands;
- **Jaakko Leppänen**, Senior scientist at the Nuclear Reactor Safety Analysis group, Technical Research Centre of Finland (VTT);
- **Jan Dufek**, Assistant professor at the Division of Nuclear Reactor Technology, Royal Institute of Technology (KTH), Sweden;
- **Aleksandar Ivanov**, PhD candidate at the Reactor Physics and Dynamics group at the Institute for Neutron Physics and Reactor Technology (INR), Karlsruhe Institute of Technology (KIT), Germany;
- **Anton Travleev**, Researcher at the Reactor Physics and Dynamics group at the Institute for Neutron Physics and Reactor Technology (INR), Karlsruhe Institute of Technology (KIT), Germany;

Schedule

Wednesday, June 4, room FA31

9:00 –9:30, **Victor Hugo Sanchez-Espinoza**, KIT
Welcome speech: "Deterministic vs. Monte Carlo simulations of nuclear reactors - a look into the future of core simulations" (30 min)
(A summary of advantages and disadvantages of deterministic and Monte Carlo solvers, and the future prospects.)

9:30 –10:00, **Jan Dufek**, KTH
Numerically stable and unstable MC-TH coupling schemes (30 min)
(The thermal-hydraulic feedback is becoming commonly integrated into Monte Carlo calculations today - here we show the consequences of an incorrect implementation, and describe a stable coupling scheme.)

10:00 - 10:20: Coffee break

10:20 –10:50, **J. Eduard Hoogenboom**, DNC
Interpolation of cross sections and thermal scattering data for a specific temperature (30 min)
(The cross section libraries are required at a great variety of temperatures during coupled MC-TH calculations; here, we explain a way to deal with this problem.)

10:50 –11:20, **Aleksandar Ivanov**, KIT
Internal MC-TH coupling (30 min)
(An internal coupling implements the feedback directly into the source code of MC solvers. This presentation explains the advantages and disadvantages of external and internal coupling, and introduces a modified MCNP with a TH feedback implementation.)

11:20 –12:00, **Jan Dufek**, KTH
Numerical stability of existing MC burnup codes (40 min)
(This presentation describes the common schemes for coupling the MC criticality and depletion solvers, and explains their numerical stability problems.)

12:00 - 13:15: Lunch

13:15 –14:15, **J. Eduard Hoogenboom**, DNC
Kinetic Monte Carlo solver (60 min)
(This presentation gives the theory and implementation details of converting MC criticality solvers into MC kinetic solvers. Promising results are demonstrated.)

14:15 - 14:30: Coffee break

14:30 –15:00, **Aleksandar Ivanov**, KIT
Fission source convergence acceleration (30 min)
(Fission source convergence is an important subject in Monte Carlo criticality calculations. Wieland's acceleration as well as its past and present implementations in Monte Carlo codes are explained. Specific improvements of the method application are presented.)

15:00 –15:45, **Jan Dufek**, KTH
Stochostic Implicit Euler based Monte Carlo burnup calculations (45 min)
(A stable MC burnup coupling scheme that has been developed within the HPMC project is then presented together with its thermal-hydraulic feedback extension.)

15:45 –16:15, **Aleksandar Ivanov**, KIT
Variance reduction in Monte Carlo criticality calculations (30 min)
(Estimating the power distribution in a criticality calculation often requires tallying large number of spatial bins. Variance reduction techniques capable of improving the statistical uncertainties for relative values as well as the efficiency of the Monte-Carlo calculations are presented.)

Thursday, June 5, room FB51

9:00 –10:00, **Anton Travleev**, KIT
MC-TH coupled calculations with the PIRS system. (60 min)
(PIRS (Python Interfaces for Reactor Simulations) allows to define a model for neutronics and TH calculations and to run MC and TH codes directly from a Python script. The presentation explains the general structure of PIRS and shows how to organize with its help coupled MCNP-SCF calculations for a PWR assembly model.)

10:00 - 10:20: Coffee break

10:20 –11:20, **Jaakko Leppänen**, VTT
SERPENT multi-physics interface (60 min)
(A new multi-physics interface was implemented into SERPENT within the HPMC project. This interface offers the user a flexible way of coupling the SERPENT code to solvers modelling various phenomena.)

11:20 –11:50, **J. Eduard Hoogenboom**, DNC
Improving the efficiency of parallel MC criticality calculations (30 min)
(This presentation explains the principal difficulties in performing efficient parallel MC criticality calculations, and suggests a way of improving the efficiency with the existing MC codes.)

11:50 –12:30, **J. Eduard Hoogenboom and Aleksandar Ivanov**, DNC, KIT
SERPENT and MCNP parallel calculations on super-