The Abdus Salam International Centre for Theoretical Physics

Nuclear Power Plant Simulators for Education

Organizer(s): Directors: Andrey Pryakhin (IAEA), Seong-Gyun Moon (IAEA), Claudio Tuniz (ICTP)
Trieste - Italy, 29 October 2007 - 9 November 2007

Venue: Adriatico Guest House Giambiagi Lecture Hall

Final programme

Monday, 29 October 2007

29 October 2007

09:00 - 10:30 (Room: Adriatico Guest House (Lower Level 1))
Registration and Administrative Formalities

10:30 - 11:00 (Room: Adriatico Guest House Giambiagi Lecture Hall)
C. Tuniz (ICTP, Trieste, Italy) & A. Pryakhin (IAEA, Vienna, Austria)
Welcoming and Introduction

11:00 - 11:15 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

11:15 - 12:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
L. Po / *Micro-Simulation Technology, Montville, USA*
PCTRAN Simulator of a PWR with Active Safety Systems

12:15 - 13:30 --- Lunch Break ---

13:30 - 15:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
L. Po / *Micro-Simulation Technology, Montville, USA*
PCTRAN Simulator of a PWR with Active Safety Systems

15:15 - 15:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

15:30 - 16:30 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
L. Po / *Micro-Simulation Technology, Montville, USA*
PCTRAN Simulator of a PWR with Active Safety Systems

Tuesday, 30 October 2007

30 October 2007

09:00 - 10:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
L. Po / *Micro-Simulation Technology, Montville, USA*
PCTRAN Simulator of a PWR with Active Safety Systems

10:15 - 10:45 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

10:45 - 12:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
L. Po / *Micro-Simulation Technology, Montville, USA*
TRIGA Simulator

12:15 - 13:30 --- Lunch Break ---

13:30 - 15:15 **R. Sollychin** / *IAEA, Vienna, Austria*
CANDU-9 Systems and Overall Unit Control

15:15 - 15:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

15:30 - 16:45 **R. Sollychin** / *IAEA, Vienna, Austria*
CANDU-9 Systems and Overall Unit Control

Wednesday, 31 October 2007

31 October 2007

09:00 - 10:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
R. Sollychin / *IAEA, Vienna, Austria*
CANDU-9 Systems and Overall Unit Control

10:15 - 10:45 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

10:45 - 12:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
R. Sollychin / *IAEA, Vienna, Austria*
CANDU-9 Systems and Overall Unit Control

12:15 - 13:30 --- Lunch Break ---

13:30 - 15:15 **R. Sollychin** / *IAEA, Vienna, Austria*
CANDU-9 Reactor Systems and Regulation

15:15 - 15:30 --- Coffee Break ---

15:30 - 16:45 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
R. Sollychin / *IAEA, Vienna, Austria*
CANDU-9 Reactor Systems and Regulation

Thursday, 1 November 2007 (All Saints)

1 November 2007

09:00 - 10:15 **R. Sollychin** / *IAEA, Vienna, Austria*
CANDU-9 Heat Transport System and Control

10:15 - 10:45 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

10:45 - 12:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
R. Sollychin / *IAEA, Vienna, Austria*
CANDU-9 Heat Transport System and Control

12:15 - 13:30 --- Lunch Break ---

13:30 - 15:15 **R. Sollychin** / *IAEA, Vienna, Austria*
CANDU-9 Balance of Plant Systems

15:15 - 15:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

15:30 - 16:45 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
R. Sollychin / *IAEA, Vienna, Austria*
Balance of Plant Systems

Friday, 2 November 2007

2 November 2007

09:00 - 10:15 **R. Sollychin** / *IAEA, Vienna, Austria*
Advanced CANDU Reactor (ACR)

10:15 - 10:45 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

10:45 - 12:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
R. Sollychin / *IAEA, Vienna, Austria*
Advanced CANDU Reactor (ACR)

12:15 - 13:30 --- Lunch Break ---

13:30 - 15:15 **R. Sollychin** / *IAEA, Vienna, Austria*
CANDU and ACR major unit events

15:15 - 15:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

15:30 - 16:45 **S.-G. Moon** / *IAEA, Vienna, Austria*
Evolution of Full-Scope Simulators Development - Korean Experience

Monday, 5 November 2007

5 November 2007

09:00 - 10:15 **W.K. Lam** / *Cassiopeia Technologies Inc., Toronto, Canada*
Advanced Pressurized Water Reactor (APWR) NPP Description and Characterics. APWR Overview. Demonstrate Simulation Effects using APWR Simulator

10:15 - 10:45 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

10:45 - 12:15 **W.K. Lam** / *Cassiopeia Technologies Inc., Toronto, Canada*
Presentation of APWR Simulator Core Model and Demonstration of Reactor Controls and Passive Safety System Responses

12:15 - 13:30 --- Lunch Break ---

13:30 - 15:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
W.K. Lam / *Cassiopeia Technologies Inc., Toronto, Canada*
Advanced PWR Simulator Exercises - (a) Hands-on Interaction with the simulator - freeze, run, IC, malfunctions, etc. (b) Review each major APWR subsystem (c) Practice power manoeuver

15:15 - 15:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

15:30 - 16:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
W.K. Lam / *Cassiopeia Technologies Inc., Toronto, Canada*
Advanced PWR Simulator Exercises - Trips and Recovery

Tuesday, 6 November 2007

6 November 2007

09:00 - 10:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
W.K. Lam / *Cassiopeia Technologies Inc., Toronto, Canada*
APWR Simulator Malfunction Exercises - Study Abnormal/Emergency Event Evolutions, Safety Limits and Operational Guidelines

10:15 - 10:45 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

10:45 - 12:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
W.K. Lam / *Cassiopeia Technologies Inc., Toronto, Canada*
APWR Simulator Exercises (continued) - Malfunctions with special focus on Passive Safety System Responses

12:15 - 13:30 --- Lunch Break ---

13:30 - 15:15 **W.K. Lam** / *Cassiopeia Technologies Inc., Toronto, Canada*
Advanced Boiling Water Reactor (ABWR) NPP Description and Characteristics; ABWR Overview and Potential Project; ESBWR. Demonstrate Simulation Effects using the ABWR Simulator

15:15 - 15:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

15:30 - 16:45 **W.K. Lam** / *Cassiopeia Technologies Inc., Toronto, Canada*
Presentation of ABWR Steady State Model and Dynamic Model as the mathematical basis for the simulator

Wednesday, 7 November 2007

7 November 2007

09:00 - 10:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
W.K. Lam / *Cassiopeia Technologies Inc., Toronto, Canada*
ABWR Steady State Mass and Energy Model Exercise - to find out how the coolant quality plays an important role in reactor power control.

10:15 - 10:45 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

10:45 - 12:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
W.K. Lam / *Cassiopeia Technologies Inc., Toronto, Canada*
Review major ABWR Subsystems - Nuclear Boiler System, Safety Systems; Auxiliary Systems; BOP; Plant Operation. ABWR Simulator Exercises - Practice Power Manoeuver.

12:15 - 13:30 --- Lunch Break ---

13:30 - 15:00 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
W.K. Lam / *Cassiopeia Technologies Inc., Toronto, Canada*
ABWR Simulator Exercises - Trips and Recovery

15:00 - 15:15 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

15:15 - 16:00 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
W.K. Lam / *Cassiopeia Technologies Inc., Toronto, Canada*
ABWR Simulator Malfunction Exercises with discussion on Safety Design Approach for: Operational Transients; Design Basis Events; Special Regulatory Mandated Event; Severe Accidents.

16:00 - 16:45 **A. Kosilov** / *IAEA, Vienna, Austria*
Methodology and Guidance on Nuclear Knowledge Management

Thursday, 8 November 2007

8 November 2007

09:00 - 10:15 **N. Tikhonov** / *Moscow Engineering & Physics Institute, Moscow, Russian Federation*
Overview of the WWER Simulator Reactor System Equipment. Constructional and Physical Characteristics of the Core.

10:15 - 10:45 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

10:45 - 12:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
N. Tikhonov / *Moscow Engineering & Physics Institute, Moscow, Russian Federation*
Overview of the WWER Simulator. Scope of the simulation, simulator display formats, distinctive features and capabilities. User interface.

12:15 - 13:30 --- Lunch Break ---

13:30 - 15:00 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
N. Tikhonov / *Moscow Engineering & Physics Institute, Moscow, Russian Federation*
WWER simulator exercises. Demonstration of transients. Review of reactor systems response.

15:00 - 15:15 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

15:15 - 16:00 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
N. Tikhonov / *Moscow Engineering & Physics Institute, Moscow, Russian Federation*
WWER simulator exercises. Practice - Reactor trips and recovery

16:00 - 16:45 **A. Kosilov** / *IAEA, Vienna, Austria*
Networking for education and training

Friday, 9 November 2007

9 November 2007

09:00 - 10:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
N. Tikhonov / *Moscow Engineering & Physics Institute, Moscow, Russian Federation*
WWER simulator exercises. Stationary processes, fuel burnup, determination of the core major neutron-physics characterists.

10:15 - 10:45 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

10:45 - 12:15 (Room: Adriatico Guest House - Eklund Informatics Lab (Lower Level 1))
N. Tikhonov / *Moscow Engineering & Physics Institute, Moscow, Russian Federation*
WWER simulator exercises. Reactor startup from hot standby.

12:15 - 13:30 --- Lunch Break ---

13:30 - 15:15 **A. Pryakhin, R. Sollychin, S.-G. Moon, A. Kosilov** / *IAEA, Vienna, Austria*
Feedback and Closing Session