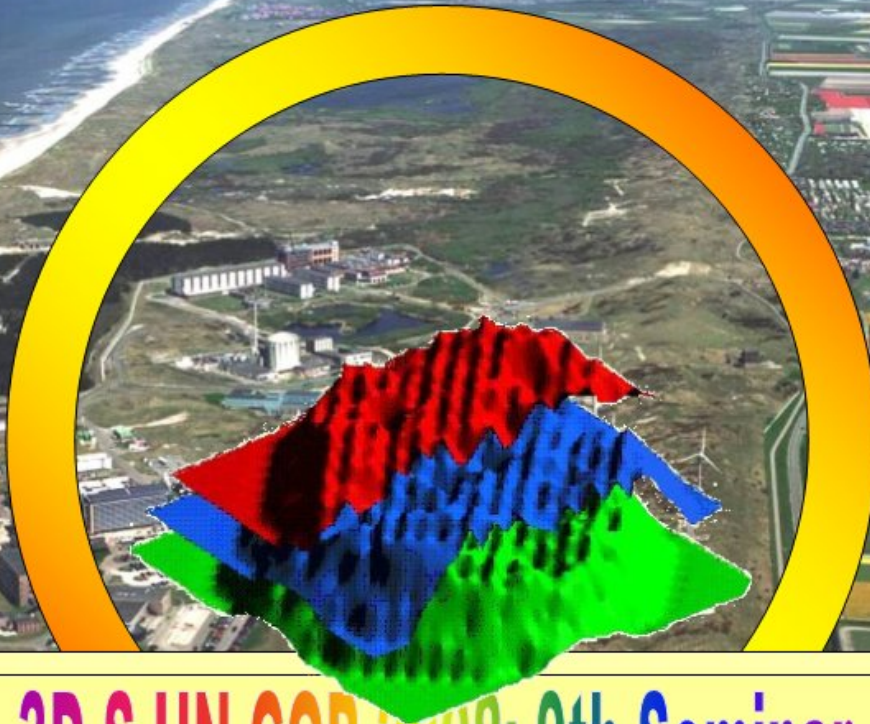




UNIVERSITÀ DI PISA  
FACOLTÀ di  
INGEGNERIA



3D S.UN COP 2008: 9th Seminar

Draft  
Announcement

**Petten - Amsterdam, The Netherlands**

October 13 – October 31, 2008

SEMINAR AND TRAINING ON  
**SCALING, UNCERTAINTY AND**  
**3D COUPLED CODE CALCULATIONS**  
IN NUCLEAR TECHNOLOGY

To be held at

European Commission, Joint Research Center, Institute for Energy (EC-JRC-IE)  
Petten. The Netherlands

<http://dimnp.ing.unipi.it/3dsuncop/>

# DRAFT PROGRAMME OUTLINE

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## LECTURERS AND CODE INSTRUCTORS

### Lecturers

A. Abdul-Razzak	Atomic Energy of Canada Limited (AECL), Canada
N. Aksan	Paul Scherrer Institute (PSI), Switzerland
T. Bajcs	Faculty of Electrical Engineering and Computing (FER), Croatia
D. Baraldi	Joint Research Center (JRC), European Commission (EC)
D. Bestion	Commissariat a l'Energie Atomique (CEA), France
M. Bykov	OKB Hidropress (OKB-GP), Russia
R. Bolado Lavin	Institute for Energy (IE), JRC, EC
C. Boyd	United States Nuclear Regulatory Commission (US NRC), USA
G. Bruna	Institut de Radioprotection et de Sûreté Nucléaire (IRSN), France
A. Bucalossi	JRC-IE, EC
F. D'Auria	University of Pisa (UNIPI), Italy
A. Del Nevo	UNIPI, Italy
M. Dzodzo	Westinghouse Electric Co. (Westinghouse), USA
C. Frepoli	Westinghouse Electric Co., USA
R. Galetti	Comissão Nacional de Energia Nuclear (CNEN), Brazil
H. Glaeser	Gesellschaft für Anlagen-und Reaktorsicherheit (GRS), Germany
D. Grgić	FER, Croatia
Y. Hassan	Texas A&M University (Texas A&M), USA
C. L. Heck	General Electric Energy Nuclear (GE), USA
R. Martin	Framatome ANP/AREVA, USA
J. Mišák	Nuclear Research Institute (NRI), Czech Republic
F. Moretti	UNIPI, Italy
D. Novog	McMaster University (McMaster), Canada
C. Parisi	UNIPI, Italy
A. Petruzzi	UNIPI, Italy
N. Popov	Atomic Energy of Canada Limited (AECL), Canada
V. Rangelova	JRC-IE, EC
J. Rempe	Idaho National Laboratory (INL), USA
F. Reventos	School of Industrial Engineering of Barcelona (ETSEIB), Spain
L. Sabotinov	IRSN, France
B. R. Sehgal	Royal Institute of Technology (KTH), Sweden
H. Tsige-Tamirat	JRC, EC
T. Van Der Hagen	Delft University (TU-Delft), The Netherlands
G. Vayssier	Nuclear Safety Consultancy (NSC), The Netherlands
C. Vitanza	Organisation for Economic Co-operation and Development (OECD)

### Code Instructors

C. Allison	Innovative Software System (ISS), USA
W. Ambrosini	UNIPI, Italy
H. Austregesilo	GRS, Germany
E. Baglietto	CD-adapco, USA
T. Downar	Purdue University (PURDUE), USA
T. Kozłowski	KTH, Sweden
G. Laviaille	CEA, France
R. Macian	Technical University of Munich (TUM), Germany
M. Naitoh	Nuclear Power Engineering Corporation (NUPEC), Japan
A. Petruzzi	UNIPI, Italy
N. Popov	AECL, Canada

# DRAFT PROGRAMME OUTLINE

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## FIRST WEEK: FUNDAMENTAL THEORETICAL ASPECTS SESSIONS

A total of 40 hours teaching will be delivered.

A minimum of 15 participants is required to provide the first week training.

### Session I

#### Welcome and Objectives of the Seminar

*Representatives of Local Institution*

#### Presentation of the Activities and Introduction to the Seminar

*F. D'Auria (UNIFI), A. Petruzzi (UNIFI)*

*L. De Barberis (JRC-IE), A. Bucalossi (JRC-IE)*

- **Lecture 0A:** Presentation of the Topics of the Seminar  
*A. Petruzzi (UNIFI, Italy)*

### Session II

#### System Codes: Evaluation, Application, Modelling and Scaling

- **Lecture 1A:** Role of System Codes in Nuclear Reactor Safety  
*F. D'Auria (UNIFI, Italy)*
- **Lecture 2A:** Features of Thermal-hydraulic System Codes  
*F. D'Auria (UNIFI, Italy)*
- **Lecture 3A:** Scaling of Thermal-hydraulic Phenomena: Addressing the Scaling Issue  
*F. D'Auria (UNIFI, Italy)*
- **Lecture 4A:** Overview of CSNI Separate Effects Test Facility Matrices for Validation of Best Estimate Thermal-Hydraulic Computer Codes  
*N. Aksan (PSI, Switzerland)*
- **Lecture 5A:** Overview of CSNI Integral Effects Test Facility Matrices for Validation of Best Estimate Thermal-Hydraulic Computer Codes  
*N. Aksan (PSI, Switzerland)*
- **Lecture 6A:** EMDAP Method for Scaling Analysis  
*M. Dzodzo (Westinghouse, USA)*
- **Lecture 7A:** Scaled Calculations for 3 Loop PWR  
*F. Reventos (ETSEIB, Spain)*

# DRAFT PROGRAMME OUTLINE

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## Session III

### International Standard Problems (ISP)

- **Lecture 8A:** Lesson Learned from OECD/CSNI International Standard Problems  
*N. Aksan (PSI, Switzerland)*
- **Lecture 9A:** Characterization and Results from ISP-42 PANDA Test  
*N. Aksan (PSI, Switzerland)*
- **Lecture 10A:** Characterization and Results from ISP-26 ROSA IV LSTFT Cold Leg Small Break LOCA Experiment  
*N. Aksan (PSI, Switzerland)*

## Session IV

### Best Estimate in System Code Applications and Uncertainty Evaluation

- **Lecture 11A:** Evaluation of Safety Margins of Operating Reactors Using “Best Estimate” Methods Including Uncertainty Analysis  
*H. Glaeser (GRS, Germany)*
- **Lecture 12A:** Approaches and Role of Analytical Support for Development of EOP  
*J. Mišák (NRI, Czech Republic)*
- **Lecture 13A:** TH Analysis for Control and Operation Support  
*F. Reventos (ETSEIB, Spain)*
- **Lecture 14A:** User Effect on Code Application and Qualification Needs  
*F. D’Auria (UNIPI, Italy)*
- **Lecture 15A:** Results from the Application of Uncertainty Methods in the CSNI Uncertainty Methods Study (UMS)  
*A. Petruzzi (UNIPI, Italy)*
- **Lecture 16A:** Major Results of the BEMUSE Programme (Best Estimate – Uncertainty and Sensitivity Evaluation)  
*A. Petruzzi (UNIPI, Italy)*
- **Lecture 17A:** The Origin of Uncertainties  
*A. Petruzzi (UNIPI, Italy)*
- **Lecture 18A:** Approaches to Calculating Uncertainty and Topics Relevant for Uncertainty Evaluation (TRUE)  
*F. D’Auria (UNIPI, Italy), A. Petruzzi (UNIPI, Italy)*

## Session V

### Qualification Procedures

- **Lecture 19A:** The Features of the UMAE Methodology  
*F. D’Auria, A. Petruzzi (UNIPI, Italy)*

# DRAFT PROGRAMME OUTLINE

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- **Lecture 20A:** Qualifying, Validating and Documenting a TH Input Deck  
*F. Reventos (ETSEIB, Spain)*
- **Lecture 21A:** Procedures for Nodalization Qualification (at Steady State and at Transient Level)  
*A. Petruzzi (UNIPI, Italy)*
- **Lecture 22A:** The FFTBM for Accuracy Evaluation: A Supporting Method for Uncertainty Tools  
*A. Petruzzi (UNIPI, Italy)*

## Session VI

### Methods for Sensitivity and Uncertainty Analysis

- **Lecture 23A:** Sensitivity and Uncertainty Analyses: Basic Concepts  
*To be contacted*
- **Lecture 24A:** The Ideas at the Basis of CIAU (Code with the capability of Internal Assessment of Uncertainty)  
*F. D'Auria, A. Petruzzi (UNIPI, Italy)*
- **Lecture 25A:** GRS Method for Uncertainty and Sensitivity Evaluation of Code Results and Applications  
*H. Glaeser (GRS, Germany)*
- **Lecture 26A:** Demonstration of the Software System for Uncertainty and Sensitivity Analyses (SUSA)  
*H. Glaeser (GRS, Germany)*
- **Lecture 27A:** Overview of Uncertainty Methods and Comparison with CSAU Methodology  
*F. D'Auria, A. Petruzzi (UNIPI, Italy)*
- **Lecture 28A:** Uncertainty and Sensitivity Analysis: Applications to advanced reactors  
*R. Bolado Lavin (JRC-IE, EC)*

## Session VII

### Relevant Topics in Best Estimate Licensing Approach

- **Lecture 29A:** Approaches to Best Estimate Analysis for Licensing of NPPs according to IAEA Safety Standards  
*J. Mišák (NRI, Czech Republic)*
- **Lecture 30A:** Risk Informed Regulation  
*G. Vayssier (NSC, The Netherlands)*
- **Lecture 31A:** Best Estimate Approach in German Licensing  
*H. Glaeser (GRS, Germany)*

# DRAFT PROGRAMME OUTLINE

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- **Lecture 32A:** EUR Prescriptions and WENRA position  
*To be confirmed*
- **Lecture 33A:** Licensing Experience with BEPU LBLOCA  
Methodologies for Siemens and Westinghouse NPP  
*R. Galetti (CNEN, Brazil)*

## Session VIII

### The CIAU/UMAE Methodology: Development

- **Lecture 34A:** CIAU Method for Uncertainty Evaluation of Code Results  
*A. Petruzzi (UNIFI, Italy)*
- **Lecture 35A:** Key Applications of CIAU Methodology  
*F. D'Auria (UNIFI, Italy)*
- **Lecture 36A:** Bifurcation Study with CIAU  
*A. Petruzzi (UNIFI, Italy)*
- **Lecture 37A:** Extension of the CIAU Methodology to 3D Neutron  
Kinetics/Thermal-hydraulics Coupled Codes: CIAU-TN  
*A. Petruzzi (UNIFI, Italy)*

## Session IX

### The CIAU/UMAE Methodology: Applications

- **Lecture 38A:** CIAU Software  
*A. Petruzzi (UNIFI, Italy)*
- **Lecture 39A:** Consistent Code Qualification Process and Applications to  
Experimental Tests performed in PKL Facility  
*A. Del Nevo (UNIFI, Italy)*
- **Lecture 40A:** Scaling Issue: Counterpart Test in the area of VVER-1000  
Technology (PSB facility)  
*F. D'Auria (UNIFI, Italy)*
- **Lecture 41A:** UMAE/CIAU Application to Mochovce NPP  
*B. Kvizda (VÚJE, Slovakia), A. Petruzzi (UPI, Italy)*
- **Lecture 42A:** CIAU Database for CATHARE Thermal-Hydraulic  
System Code  
*A. Del Nevo (UNIFI, Italy)*

# DRAFT PROGRAMME OUTLINE

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## SECOND WEEK: INDUSTRIAL APPLICATIONS, COUPLING METHODOLOGIES AND HANDS-ON TRAINING SESSIONS

A total of 20 hours teaching will be delivered during the morning sessions  
A minimum of 20 participants is required to provide the second week training.

### Session I Mornings

#### Industrial Applications of Best Estimate + Uncertainty Methodologies

- **Lecture 1B:** Westinghouse Realistic Large Break LOCA Methodologies: Evolution from Response Surface Methods to Statistical Sampling Technique  
*C. Frepoli (Westinghouse, USA)*
- **Lecture 2B:** AREVA NP's Realistic Large Break LOCA Methodology  
*R. Martin (AREVA, USA)*
- **Lecture 3B:** Best Estimate and Uncertainty Analysis for CANDU Reactors  
*N. Popov (AECL, Canada)*
- **Lecture 4B:** GE Techniques for Establishing and Confirming Uncertainties for Transient and Accident Applications  
*C. L. Heck (GE, USA)*
- **Lecture 5B:** The Angra-2 DEGB Licensing Calculation by the UMAE/CIAU Method  
*R. Galetti (CNEN, Brazil), F. D'Auria (UNIPI, Italy)*
- **Lecture 6B:** Best Estimate Analysis in WWER-1000 NPP  
*M. Bykov (OKB-GP, Russia)*

### Session II Mornings

#### 3D Neutron-Kinetics/Thermal-Hydraulics (NK-TH) Coupling

- **Lecture 7B:** Procedures and Codes for XS Generation  
*D. Grgić (FER, Croatia)*
- **Lecture 8B:** Introduction to Cross-Section Sensitivity and Uncertainty Analysis  
*H. Tsige-Tamirat (JRC, EC)*

# DRAFT PROGRAMME OUTLINE

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- **Lecture 9B:** Basis for Coupling 3D Neutron-Kinetics/Thermal-Hydraulics Codes  
*D. Grgić (FER, Croatia)*
- **Lecture 10B:** PWR/WWER 3D NK-TH Coupled Analysis  
*D. Grgić (FER, Croatia)*
- **Lecture 11B:** 3D NK-TH Coupled Analysis with RELAP5/PARCS and RELAP5-3D©-NESTLE  
*C. Parisi (UNIPI, Italy)*

## Session III Mornings

### Interactions of Thermal-Hydraulics with Fuel behaviour, Structural Mechanics and Computational Fluid Dynamics

- **Lecture 12B:** Modelling Fuel Behaviour and its Interaction with Thermal-hydraulics  
*C. Vitanza (OECD)*
- **Lecture 13B:** Safety Limits, with Particular Reference to High Burn-Up  
*C. Vitanza (OECD)*
- **Lecture 14B:** Mox Fuel and related Safety Issues  
*G. Bruna (IRSN, France)*
- **Lecture 15B:** Pressurised Thermal Shock  
*C. Boyd (USNRC, USA)*
- **Lecture 16B:** The BWR Stability Issue  
*T. Van Der Hagen (TU-Delft, The Netherlands)*
- **Lecture 17B:** Role of CFD Codes and Bases for their Use in Nuclear Reactor Technology  
*Y. Hassan (Texas A&M, USA)*

## Session IV Mornings

### International Programs relevant for Safety Analysis in NPP

- **Lecture 18B:** Overview of TH Code-related Activities in the EC TACIS/PHARE framework  
*A. Bucalossi (JRC-IE, EC)*
- **Lecture 19B:** NEA Benchmarks (including Reactivity Initiated Accidents)  
*F. D'Auria (UNIPI, Italy), E. Sartori (OECD)*
- **Lecture 20B:** Two-phase CFD activities in CSNI-GAMA-WG3 and in the NURESIM project  
*D. Bestion (CEA, France)*

# DRAFT PROGRAMME OUTLINE

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Parallel  
Session A

Code  
Training  
Afternoons

## Invited Code Specific Lectures and Hands-on Training (20 hrs each)

A minimum of **five** participants per code is required to provide the respective training.

### Thermal-hydraulic System Codes

- **Parallel Training PA1:** ATHLET  
*H. Austregesilo (GRS, Germany)*
- **Parallel Training PA2:** CATHARE  
*G. Laviaille (CEA, France)*
- **Parallel Training PA3:** CATHENA  
*N. Popov (AECL, Canada)*
- **Parallel Training PA4:** RELAP5  
*W. Ambrosini, A. Petruzzi (UNIFI, Italy)*
- **Parallel Training PA5:** TRACE  
*R. Macian (TUM, Germany)*

### Neutron-Kinetics Codes and 3D NK-TH Coupling

- **Parallel Training PA6:** PARCS  
*T. Downar (PURDUE, USA)*  
*T. Kozłowski (KTH, Sweden)*

### Thermal-Hydraulic and Severe Accident Codes

- **Parallel Training PA7:** IMPACT  
*M. Naitoh (NUPEC, Japan)*
- **Parallel Training PA8:** RELAP\SCDAPSIM  
*C. Allison (ISS, USA)*

Parallel  
Session B

Special  
Session  
Afternoons

## Special Sessions (20 hrs each)

A minimum of **ten** participants per session is required to provide the respective lectures/hands-on training.

- **Parallel Training PB1: Computational Fluid Dynamics**
  - **Lecture PB1-1:** Models and Capabilities of CFD Codes  
*Y. Hassan (Texas A&M, USA)*
  - **Lecture PB1-2:** Validation Activities for CFD Codes  
*Y. Hassan (Texas A&M, USA)*
  - **Lecture PB1-3:** Two-phase CFD application to boiling flows and CHF investigations  
*D. Bestion (CEA, France)*

# DRAFT PROGRAMME OUTLINE

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- **Lecture PB1-4:** Two-phase CFD application to stratified flow, DCC and PTS  
*D. Bestion (CEA, France)*
- **Lecture PB1-5:** Validation and application of CFD codes to the hydrogen issue in the containment  
*D. Baraldi, H Wilkening, M Heitsch (JRC-EC)*
- **Lecture PB1-6:** Prediction of Boron Mixing with CFD Codes  
*F. D'Auria, F. Moretti (UNIFI, Italy)*
- **Hands-on Training : STAR-CD**  
*E. Baglietto (CD-adapco, USA)*
- **Parallel Training PB2: Severe Accident Analysis**
  - **Lecture PB2-1:** Severe Accident Phenomenology  
*J. Rempe (INL, USA)*
  - **Lecture PB2-2:** Severe Accident Analysis Codes  
*J. Rempe (INL, USA)*
  - **Lecture PB2-3:** AREVA NP's Severe Accident Safety Issue Resolution Methodology  
*R. Martin (AREVA NP, USA)*
  - **Lecture PB2-4:** Severe Accident Analysis and Applications  
*B.R. Sehgal (KTH, Sweden)*
  - **Hands-on Training : RELAP\SCDAPSIM**  
*C. Allison (ISS, USA)*
- **Parallel Training PB3: WWER Technology: Thermal-Hydraulics, Safety Design and Computer Codes**
  - **Lecture PB3-1:** WWER Thermal-Hydraulics Design  
*M. Bykov (OKB-GP, Russia)*
  - **Lecture PB3-2:** WWER Thermal-Hydraulics Phenomena  
*M. Bykov (OKB-GP, Russia)*
  - **Lecture PB3-3:** WWER Safety and Safety Systems  
*M. Bykov (OKB-GP, Russia)*
  - **Lecture PB3-4:** The WWER Validation Matrix  
*M. Bykov (OKB-GP, Russia)*
  - **Lecture PB3-5:** WWER Computer Code V&V  
*M. Bykov (OKB-GP, Russia)*
  - **Lecture PB3-6:** WWER Best Estimate and Uncertainty Analysis  
*M. Bykov (OKB-GP, Russia)*
  - **Lecture PB3-7:** CATHARE Validation and Assessment of WWER experimental facilities.  
*L. Sabotinov (IRSN, France)*

# DRAFT PROGRAMME OUTLINE

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- **Lecture PB3-8:** Accident Analysis of WWER NPP by CATHARE code  
*L. Sabotinov (IRSN, France)*
- **Lecture PB3-9:** WWER Transient Analysis Applications  
*Contributions from: A. Bucalossi, V. Rangelova (JRC-IE, EC), F. D'Auria (UNIFI, Italy)*
- **Parallel Training PB4: CANDU Technology: Thermal-Hydraulics, Safety Designs, Computer Codes**
  - **Lecture PB4-1:** CANDU Thermal-Hydraulics Design  
*N. Popov (AECL, Canada)*
  - **Lecture PB4-2:** CANDU Thermal-Hydraulics Phenomena  
*D. Novog (McMaster University, Canada)*
  - **Lecture PB4-3:** CANDU Safety and Safety Systems  
*N. Popov (AECL, Canada)*
  - **Lecture PB4-4:** CANDU Computer Code V&V  
*N. Popov (AECL, Canada)*
  - **Lecture PB4-5:** CANDU PIRTs  
*N. Popov (AECL, Canada)*
  - **Lecture PB4-6:** CANDU BEAU (Best Estimate And Uncertainty)  
*A. Abdul-Razzak (AECL, Canada)*
  - **Lecture PB4-7:** CANDU BEAU Sample  
*A. Abdul-Razzak (AECL, Canada)*
  - **Lecture PB4-8:** CANDU Transient Analysis Applications  
*D. Novog (McMaster University, Canada)*
- **Parallel Training PB5: GEN-IV Technology: Thermal-Hydraulics, Safety Designs, Computer Codes**

## *Topics (to be confirmed)*

- The Generation IV Roadmap Project
- Advanced Numerical Simulation and Safety Demonstration of Generation IV Concepts
- The GEN-IV Sodium Fast Reactor
- The GEN-IV Very High Temperature Reactors
- The GEN-IV Super Critical Water Reactors

## *Lecturers (to be confirmed)*

G. Bruna (IRSN, France), G. L. Fiorini (CEA, France),  
L. E. Herranz (CIEMAT, Spain), D. Novog (McMaster University)

# DRAFT PROGRAMME OUTLINE

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## THIRD WEEK: CODE HANDS-ON TRAINING FOR TRANSIENT ANALYSIS IN ITF

A total of 40 hours of hands-on training will be delivered.  
A minimum of **ten** participants is required to provide the third week.

### Session I

#### BETHSY ITF

- **Lecture 1D:** Description of the BETHSY Facility  
*T. Bajs (FER, Croatia)*
- **Lecture 2D:** Description of BETHSY RELAP5 Nodalization  
*T. Bajs (FER, Croatia)*
- **Exercise 1:** **Nodalization Development - Tools: RELAP5**  
*T. Bajs (FER, Croatia)*
- **Exercise 2:** **Application of the Proposed Methodology at Steady State Level**  
*T. Bajs (FER, Croatia)*
- **Lecture 3D:** Description of the BETHSY Test 9.1.b (ISP27)  
*T. Bajs (FER, Croatia)*
- **Exercise 3:** **Application of the Proposed Methodology at Transient Level - Tools: RELAP5, FFTBM**  
*T. Bajs (FER, Croatia)*
- **Exercise 4:** **Application of the Proposed Methodology for Uncertainty Evaluation - Tools: CIAU**  
*A. Petruzzi (UNIPI, Italy)*
- **Exercise 5:** **Detection of 'Simple' Input Error - Tools: RELAP5**  
*T. Bajs (FER, Croatia), A. Petruzzi (UNIPI, Italy)*

### Session II

#### LOFT (or PMK) ITF

- **Lecture 4D:** Description of the ITF Facility  
*A. Petruzzi (UNIPI, Italy)*
- **Lecture 5D:** Description of ITF RELAP5 Nodalization  
*A. Petruzzi (UNIPI, Italy)*
- **Exercise 6:** **Nodalization Development - Tools: RELAP5**  
*A. Petruzzi (UNIPI, Italy)*

# DRAFT PROGRAMME OUTLINE

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- **Exercise 7:** Application of the Proposed Methodology at Steady State Level  
*A. Petruzzi (UNIFI, Italy)*
- **Lecture 6D:** Description of the ITF Transient Test  
*A. Petruzzi (UNIFI, Italy)*
- **Exercise 8:** Application of the Proposed Methodology at Transient Level - Tools: RELAP5, FFTBM  
*A. Petruzzi (UNIFI, Italy)*
- **Exercise 9:** Application of the Proposed Methodology for Uncertainty Evaluation - Tools: CIAU  
*A. Petruzzi (UNIFI, Italy)*

## Session III

### VISIT TO THE HIGH FLUX REACTOR (HFR)

- Presentation of the JRC and the Main HFR Activities
- Entrance in the Vital HFR Area
- Entrance in the HFR Control Room

## Session IV

### EVALUATION SESSION

#### *Learning Examination on Training Programme*

- Written Evaluation on Specific Training Topics
- Resolution of Calculation Errors in Input Decks (RELAP5)
- Final Discussion on Learning Examination Topics

#### *Closing Ceremony*

- Evaluation of the Seminar from the Participants
- Presentation of the Participation Certificate

# DRAFT PROGRAMME OUTLINE

## TIME SCHEDULE

I WEEK	13/10/2008	14/10/2008	15/10/2008	16/10/2008	17/10/2008
8:30 – 10.30	Lectures A: Sessions I to IX				
10:30 – 11.00	Coffee Breaks				
11:00 – 13.00	Lectures A: Sessions I to IX				
13:00 – 14.00	Lunches				
14:00 – 16.00	Lectures A: Sessions I to IX				
16:00 – 16.30	Coffee Breaks				
16:30 – 18.30	Lectures A: Sessions I to IX				
20:00 – 23.00	Official Dinner				

II WEEK	20/10/2008	21/10/2008	22/10/2008	23/10/2008	24/10/2008
8:30 – 10.30	Lectures B: Sessions I to IV				
10:30 – 11.00	Coffee Breaks				
11:00 – 13.00	Lectures B: Sessions I to IV				
13:00 – 14.00	Lunches				
14:00 – 16.00	Parallel Sessions A: PA1 – PA8				
14:00 – 16.00	Parallel Sessions B: PB1 – PB5				
16:00 – 16.30	Coffee Breaks				
16:30 – 18.30	Parallel Sessions A: PA1 – PA8				
16:30 – 18.30	Parallel Sessions B: PB1 – PB5				
20:00 – 23.00	Official Dinner				

III WEEK *	27/10/2008	28/10/2008	29/10/2008	30/10/2008	31/10/2008
8:30 – 10.30	Lectures D and Exercises: Sessions I to II				Lectures D and Exercises: Sessions IV
10:30 – 11.00	Coffee Breaks				
11:00 – 13.00	Lectures D and Exercises: Sessions I to II		Visit to the HFR Session III	Lectures D and Exercises: Sessions IV	
13:00 – 14.00	Lunches				
14:00 – 16.00	Lectures D and Exercises: Sessions I to II		Lectures D and Exercises: Sessions IV		
16:00 – 16.30	Coffee Breaks				Closing Ceremony
16:30 – 18.30	Lectures D and Exercises: Sessions I to II		Lectures D and Exercises: Sessions IV		
20:00 – 23.00	Official Dinner				

\*At the moment it is foreseen to use the RELAP5 code (the use of other codes may also be considered, depending on the number of requests received).

## History of the Seminar

The **3D S.UN.COP 2008** at the **Institute for Energy (IE), Joint Research Center (JRC) of European Commission** will be the ninth seminar of its kind organized in five years. The previous eight seminars were successfully held at:

- The University of Pisa (Pisa, Italy), 5 – 9 January 2004 (6 participants) and 14 – 18 June 2004 (11 participants);
- The Pennsylvania State University (University Park, PA, USA), 24 – 28 May 2004 (15 participants);
- The University of Zagreb (Zagreb, Croatia), 20 June – 8 July 2005 (19 participants);
- The Polytechnic University of Catalonia (Barcelona, Spain), 23 January – 10 February 2006 (33 participants);
- The Autoridad Regulatoria Nuclear (ARN), the Comisión Nacional de Energía Atómica (CNEA), the Nucleoelectrica Argentina S.A (NA-SA) and the Universidad Argentina De la Empresa (Buenos Aires, Argentina), 2 October – 14 October 2006 (37 participants);
- The Texas A&M University (College Station, Texas, USA), 22 January – 9 February 2007 (26 participants);
- The McMaster University, the Atomic Energy of Canada Limited (AECL), the Canadian Nuclear Society (CNS), the Canadian Nuclear Safety Commission (CNSC), 8 October – 26 October 2007 (33 participants).

## Organization

The University of Pisa (UNIFI), the Institute for Energy (IE) of JRC, the Faculty of Electrical Engineering and Computing (FER) of Zagreb and the School of Industrial Engineering of Barcelona (ETSEIB) are **jointly** organizing a Seminar and Training to transfer competence, knowledge and experience in the area of Scaling, Uncertainty and 3D Coupled Code Calculations.

The seminar will take place in **Petten**, close to Amsterdam (**The Netherlands**) from **October 13<sup>th</sup> to October 31<sup>st</sup>, 2008** at the Institute for Energy (IE) of EC JRC. It will be held in the modern classrooms which are equipped with data projectors and networked PCs suitable for running advanced best estimate thermal-hydraulic codes (e.g. RELAP5).

The seminar is open to universities, vendors, national laboratories and regulatory bodies. At least two years' experience in the use of a thermal-hydraulic system code is needed to participate in the course. A minimum of twenty participants is required to organize the seminar. A maximum of 40 persons will be accepted.

The seminar is subdivided into three parts and participants may choose to attend a one-, two- or three-week course. The first week is dedicated to lectures describing the concepts of the proposed methodologies; the second week is devoted to training and to the applied part while the third week will be dedicated to user qualification, including a learning examination on the topics of the seminar. The participants will be divided into groups of threes or fours and each group will be accompanied by an expert during the entire training activity. The application of the proposed methodology will be illustrated through tests in the BETHSY, LOFT and/or in the PMK facility. A visit to the High Flux Reactor (HFR) will be organized during the third week of the course

Further information about participation and registration as well as useful practical information can be obtained from Alessandro Petruzzi at the following email address: [a.petruzzi@ing.unipi.it](mailto:a.petruzzi@ing.unipi.it). Special accommodation will be offered on a separate sheet. An internet website with the latest news is also available at: <http://dimnp.ing.unipi.it/3dsuncop/>

## Objective of the Seminar/Training

To transfer to the participants competence and experience in uncertainty methodologies and 3D coupled code calculations from activities carried out over the last two decades by a group of experts from different organizations (university professors, researchers and industrial experts) through participation in benchmarks, International Standard Problems and international cooperation. The University of Pisa will be the leader of the planned activities. Managers and research strategists would also benefit from attending the Seminar.

## Expected Products

The Seminar will provide a transfer of experience and know-how from recognized experts in the respective fields. It will thus contribute to maintaining and increasing technical competence and to ensuring the sustainable development of nuclear technology. CDs containing all lectures will be distributed to the participants.

## Organizing Committee

A. Petruzzi (UNIFI)  
A. Bucalossi (JRC-IE)  
P. Pla (UNIFI)  
T. Bajs (FER)

## Scientific Committee

F. D'Auria (UNIFI)  
L. De Barberis (JRC-IE)  
D. Grgić (FER)  
F. Reventos (ETSEIB)  
N. Aksan (PSI)  
Y. Hassan (Texas A&M)  
E. Sartori (OECD)



UNIVERSITÀ DI PISA  
FACOLTÀ di  
INGEGNERIA



# 3D S.UN.COP 2008: 9th Seminar

## Seminar and Training on Scaling, Uncertainty and 3D Coupled Code Calculations in Nuclear Technology

October 13 – 31, 2008, Institute for Energy (IE), Joint Research Center (JRC), Petten

### REGISTRATION FORM

To be returned by 11 July 2008

Last name: ..... First name: .....  
 Title: ..... Organization: .....  
 Address: .....  
 City: ..... State: ..... Zip Code: ..... Country: .....  
 Phone: ..... Fax: ..... Email: .....  
 (Please type all information as you wish it to appear on your name badge)

#### On entering the Petten site, which is a secured area, you need to present your passport or identity card

Nationality: ..... Date of Birth: .....  
 Passport or ID Number: ..... Date of Issue: ..... Expiry Date: .....  
 Private Address: ..... City: ..... Country: .....

#### TO BE COMPLETED ONLY BY PARTICIPANTS IN THE SECOND WEEK

Please select the parallel session in which you are interested:  
 (ONE topic only, EITHER from Session A or B, may be chosen)

##### Parallel Sessions A: PA1 – PA8

PA1-ATHLET  PA2-CATHARE  PA3-CATHENA   
 PA4-RELAP5  PA5-TRACE  PA6-PARCS   
 PA7-IMPACT  PA8-RELAP\SCDAP

##### Parallel Session B: PB1-PB5

PB1-COMPUTATIONAL FLUID DINAMICS   
 PB2-SEVERE ACCIDENT ANALYSIS   
 PB3-WWER TECHNOLOGY   
 PB4-CANDU TECHNOLOGY   
 PB5-GEN-IV TECHNOLOGY

Please indicate your level of expertise in using the  
 selected code in **Parallel Session A**

- Never used**  
 **Beginner** (very few calculations performed)  
 **Intermediate** (developed at least one full nodalization)  
 **Advanced** (developed more than one full nodalization)  
 **Expert** (more than five years of experience)

Do you wish to visit the HFR reactor on the  
 morning of October 30<sup>th</sup>?

**YES**  **NO**

#### Registration Fees

Include the proceedings, lunches, coffee breaks and the official dinners (one per week):

13 October – 17 October 2008 – 3D S.UN.COP: 9<sup>th</sup> Seminar (first week) .....  €2000  
 20 October – 24 October 2008 – 3D S.UN.COP: 9<sup>th</sup> Seminar (second week) .....  €2500  
 13 October – 24 October 2008 – 3D S.UN.COP: 9<sup>th</sup> Seminar (first and second week) .....  €3500  
 20 October – 31 October 2008 – 3D S.UN.COP: 9<sup>th</sup> Seminar (second and third week) .....  €3500  
 13 October – 31 October 2008 – 3D S.UN.COP: 9<sup>th</sup> Seminar (all three weeks) .....  €4000

\* *Bank charges to be added to registration fees*

#### Payment by 31 July 2008

Information will be provided after July 11<sup>th</sup>, 2008.

The Registration Form should be sent to:

Alessandro Petruzzi :

FAX #: 0039 050 2210384

email: [a.petruzzi@ing.unipi.it](mailto:a.petruzzi@ing.unipi.it)