

**CURRICULUM VITAE  
OF  
KOSTADIN N. IVANOV, Ph.D.**

**DISTINGUISHED PROFESSOR OF NUCLEAR ENGINEERING, NCSU, USA  
HEAD OF NUCLEAR ENGINEERING DEPARTMENT**

Professor Ivanov earned his Ph.D. degree in reactor physics from Bulgarian Academy of Sciences in 1990. Prior to joining the North Carolina State University (NCSU) in 2015, he held research and academic positions at the Pennsylvania State University (PSU), Research Center Rossendorf Inc. in Germany; Institute of Nuclear Research and Nuclear Energy in Sofia; Technical University of Sofia; and Kozloduy Nuclear Power Plants in Bulgaria. At PSU Dr. Ivanov has established Reactor Dynamics and Fuel Modeling Group (RDFMG) in order to address the current demands for more accurate and efficient analyses, which directly relate to safety and economic performance of current and next generations of nuclear systems; in 2015 he reestablished RDFMG at NCSU. The research performed by RDFMG is in the area of developing methods and computer codes for multi-dimensional reactor core analysis. These developments include computational methods, numerical algorithms and iterative techniques, nuclear fuel management and reloading optimization techniques, reactor kinetics and core dynamics methods, cross-section generation and modeling algorithms for multi-dimensional steady-state and transient reactor calculations and coupling three-dimensional (3-D) kinetics models with thermal-hydraulic codes. He has also led the development of multi-dimensional neutronics, in-core fuel management and coupled 3-D kinetics/thermal-hydraulic computer code benchmarks, multi-dimensional reactor transient and safety analysis methodologies as well as integrated analysis of safety-related parameters, system transient modeling of power plants, and in-core fuel management analyses. The effort has led to establishing his group, initially at PSU and currently at NCSU, as an international center for qualification of coupled 3-D kinetics/thermal-hydraulics codes. Dr. Ivanov's work has been published in over three hundred (300) papers in peer-reviewed journals and proceedings. He has graduated one hundred and six (106) MEng, sixty (64) MS and forty-five (45) PhD students. Dr. Ivanov has been able to maintain continuous diverse research support from international and national government agencies, national laboratories, industry, consulting companies, and other universities. He has been Principal Investigator and Co-Principal Investigator for more than ninety (90) externally supported projects in total of approximately ten million dollars of external funding. Dr. Ivanov has led ten (10) international programs supported by NEA/OECD, US NRC, and US DOE. His activities in the area of teaching have been focused on introduction, improvement and teaching of undergraduate and graduate courses in the areas of nuclear reactor physics, analysis, design and safety, which are keystones of Nuclear Engineering education. He has taught in total one hundred (100) classes for resident students and forty (40) classes for continuing (distance) education over the last twenty (20) years. The curriculum for most of these classes was updated and complete lecture notes were prepared. Computer-based projects were introduced and teaching the theory was connected with computer simulation and analysis. As a Department Head of Nuclear Engineering at NCSU Dr. Ivanov has grown the department by about 50% since 2015 in terms of tenure-track/tenured faculty and graduate students. Currently the department is the second largest nuclear engineering department in the country. Under his leadership the Nuclear Engineering Graduate Program ranking by US News and World Report improved from eighth to third place in the USA and this advanced ranking has been sustained for 4 years.

**PERSONAL DATA**

Date of Birth: April 20, 1956

Place of Birth: Dimitrovgrad, Bulgaria

US Citizen

## EDUCATION

MEng (1982) – Nuclear Engineering, Moscow Institute of Power Engineering

Ph.D. (1990) – Reactor Physics, Institute of Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences

## POSITIONS

*December 14, 2022 – present* – North Carolina State University, Department of Nuclear Engineering, **Distinguished Professor and Department Head.**

*August 16, 2015 – December 13, 2022* – North Carolina State University, Department of Nuclear Engineering, **Professor and Department Head.**

*January 2012 – August 15, 2015* - The Pennsylvania State University, Department of Mechanical and Nuclear Engineering, Nuclear Engineering Program, **Distinguished Professor, Graduate Coordinator of Nuclear Engineering Program**

*January 2011 - April 2012* – Karlsruhe Institute of Technology, Department of Mechanical Engineering, Visiting Professor - **Chair of the Dynamics of Nuclear Systems Area and Head of Reactor Physics and Dynamics Group** at the Institute for Neutron Physics and Reactor Technology.

*December 2007 - December 2011* - The Pennsylvania State University, Department of Mechanical and Nuclear Engineering, Nuclear Engineering Program, **Distinguished Professor, Director of RDFMG**

*July 2004 - November 2007* - The Pennsylvania State University, Department of Mechanical and Nuclear Engineering, Nuclear Engineering Program, **Professor, Director of RDFMG**

*August 1999 – June 2004* - The Pennsylvania State University, Department of Mechanical and Nuclear Engineering, Nuclear Engineering Program, **Associate Professor**

*August 1997 – July 1999* – The Pennsylvania State University, Department of Mechanical and Nuclear Engineering, Nuclear Engineering Program, **Assistant Professor**

*January 1996 - July 1997* – The Pennsylvania State University, Department of Nuclear Engineering, **Research Associate**

*June 1995 - January 1996* - Research Center Rossendorf Inc., Germany Institute for Safety Research, Department of Transient Analysis, **Visiting Scientist**

*1993 - 1995* – The Pennsylvania State University, Department of Nuclear Engineering, **Visiting Research Scholar**

*1987 - 1993* – Institute of Nuclear Research and Nuclear Energy, Sofia, Bulgaria, Department of Neutron and Reactor Physics, **Senior Research Scientist**

*1991 -1993* – Technical University of Sofia, Sofia, Bulgaria, Department of Nuclear Engineering, **Assistant Professor**

*1985 - 1987* - Institute of Nuclear Research and Nuclear Energy, Sofia, Bulgaria, Department of Neutron and Reactor Physics, **Research Scientist**

*1984 - 1985* – Kozloduy Nuclear Power Plants, Kozloduy, Bulgaria, Research Division, **Physicist**

*1982 - 1984* – Kozloduy Nuclear Power Plants, Kozloduy, Bulgaria, Operation Division, **Nuclear Engineer**

## EXPERTISE

Reactor physics; Development of methods and computer codes for multidimensional reactor core analysis; Nuclear fuel management and reloading optimization techniques; Reactor kinetics and core dynamics; Cross-section generation and modeling algorithms; Safety analysis and thermal-hydraulics; Coupling three-dimensional (3-D) kinetics models with thermal-hydraulic codes; Validation/verification of reactor core simulators, and uncertainty quantification and propagation.

## TEACHING

Basic Reactor Physics Courses, Senior Reactor Design Course, Nuclear Fuel Management, Reactor Kinetics and Dynamics, Monte Carlo Methods, Neutron Transport Theory, Fuel Performance, Verification, Validation in Scientific Computing, and Uncertainty Quantification in Multi-Physics Modeling and Simulations.

His activities in the area of teaching have been focused on introduction, improvement and teaching of undergraduate and graduate courses in the areas of nuclear reactor physics, analysis, design and safety, which are keystones of Nuclear Engineering education. He has taught in total one **hundred (100) classes for resident students and forty (40) classes for continuing (distance) education** over the last twenty (20) years. The curriculum for most of these classes was updated and complete lecture notes were prepared. Computer-based projects were introduced and teaching the theory was connected with computer simulation and analysis. At NCSU Dr. Ivanov contributed to improving capstone senior design classes and projects (NE 406 and NE 408) by converting them in “real world” experience under the sponsorship and mentorship of industry and national labs.

### Description of New/Improved Courses

- Uncertainty Quantification and Propagation in Multi-Physics Modeling and Simulations - Development of the curriculum and lecture notes of new graduate course
- Verification and Validation in Scientific Computing - Development of the curriculum and lecture notes of new graduate course
- Nuclear Fuel Performance – Development of the curriculum and lecture notes of new undergraduate elective and graduate course
- Adding economic and global component to senior capstone design projects
- Nuclear Reactor Core Design Synthesis—Modifications of course content and updated lecture notes
- Advanced Reactor Design—Updated course content and prepared complete lecture notes
- Neutron Transport Theory—Updated course content and prepared complete lecture notes
- Nuclear Fuel Management - Updated course content and prepared complete lecture notes

New methods have been introduced in teaching graduate classes in order to familiarize students with advanced methods and computer algorithms for reactor analysis. Teaching theory and methods of advanced reactor analysis is combined with practical computer projects.

## PARTICIPATION AND LEADERSHIP IN INTERNATIONAL RESEARCH PROGRAMS

1. NEA/OECD Rostov-2 VVER-1000 Multi-Physics Transient Benchmark - **Coordinator** (on-going)
2. NEA/OECD TVA WB1 PWR Multi-Physics Multi-Cycle benchmark - **Coordinator** (on-going)

3. NEA OECD Multi-physics Pellet Cladding Mechanical Interaction Validation (MPCMIV), **Coordinator** (ongoing).
4. Nuclear Science Committee (NSC) of the Nuclear Energy Agency (NEA), OECD, **Member**, 2018 – present.
5. Working Party on Scientific Issues of Reactor Systems (WPRS) at Nuclear Science Committee, Nuclear Energy Agency (NEA), OECD, **Chair**, 2018 – present.
6. NEA/OECD LWR UAM Scientific Board / Program Committee and Benchmark – **Chair and Coordinator**, 2007 - present.
7. IAEA CRP on HTGR Reactor Physics, Thermal-Hydraulics and Depletion Uncertainty Analysis – **Coordinator**, 2012 – present.
8. NEA/OECD NSC Expert Group on Uncertainty Analysis in Modeling (UAM) – **Member**, 2012 – present.
9. Methods & Guidelines Committee of the US Department Of Energy (DOE) Nuclear Energy Knowledge and Validation Center (NEKVAC) – **Member**, 2012-2015.
10. South African NNR Center for Nuclear Safety and Security (CNSS) – **Member**, 2018 - present.
11. NEA/OECD Expert Group on Multi-Physics Experimental data, Benchmarking and Validation (MPEBV) - **Member**, 2014 – 2019.
12. OECD/DOE HTR Prismatic Coupled Code Benchmark – **Member of Coordination Committee**, 2011 – 2015.
13. OECD/NRC Oskarshamn-2 Stability Benchmark - **Member of Coordination Committee**, 2011-2015.
14. OECD Kalinin-3 Coupled Code Benchmark – **Member of Coordination Committee**, 2009-2014.
15. DOE International Nuclear Safety Program - **Coordinator**, 2000-2005
16. OECD/NRC BFBT Benchmark - **Coordinator**, 2004-2008
17. OECD PBMR-400 Coupled Code Benchmark - **Member of Coordination Committee**, 2005-2008.
18. OECD/DOE/CEA VVER-1000 CT Benchmark - **Coordinator**, 2001-2006.
19. EC/DOE CRISSUE-S Project on the State-of-the Art of the 3-D Coupled Methodologies – **Member**, 2001-2003
20. OECD/NRC BWR TT Benchmark - **Coordinator**, 1999 –2003.
21. OECD/NRC PWR MSLB Benchmark - **Coordinator**, 1997 – 1999.
22. TRAC User’s Group – **Member**, 1996 – 1999.
23. Cooperative Research Program Between PSU, USA and INRNE, Sofia, Bulgaria on Nuclear Reactor Transient and Accident Analysis - **Organizer**, 1998 – 2000.
24. IAEA Research Coordinated Program on LWR Benchmark Definition for In-core Fuel Management Code Validation Related to Core Physics – **Member**, 1989-1993.
25. IAEA Research Coordinated Program on Safe Core Management with Burnable Absorbers in VVER Reactors – **Member**, 1989-1993.
26. International Scientific Cooperation AER on VVER Reactor Physics – **Member**, 1986-1993.

27. Cooperative Research Programs Between INRNE, Sofia, Bulgaria and IPPE, Obninsk, Russia on Methods and Computer Codes for FBR Core Analysis and Numerical Investigations for Advanced FBR Core Design Optimization – **Member**, 1986-1991.

## **HONORS AND AWARDS**

1. Title of Distinguished Professor of Nuclear Engineering, The North Carolina State University, December 14, 2022
2. ANS Fellow – May 2020
3. Marin Drinov Medal, the highest honor awarded by the Bulgarian Academy of Sciences for scientific achievements & contributions to cooperation between American & Bulgarian scientists in Nuclear Science and Engineering – December 2019
4. NCSU Outstanding Global Engagement Award – April 2018.
5. Best Paper Award - Joint International Conference on Supercomputing in Nuclear Applications and Monte Carlo 2013 (SNA + MC 2013), Paris, France October 2013.
6. Renewal of Title of Distinguished Professor of Nuclear Engineering - 2012
7. US DOE Innovations in Fuel Cycle Research Award - 2010
8. Best Paper Award - International ANS Conference PHYSOR-2010, May 2010, Pittsburgh, PA, USA – 2010.
9. 2009 Penn State Engineering Society Premier Research Award
10. Title of Distinguished Professor of Nuclear Engineering, The Pennsylvania State University, 2007
11. Sabbatical Leave for the Fall Semester of 2006 - Sabbatical Leave at GRS and Technical University of Munich, Germany
12. ANS M&C 2003 Reviewer Award
13. 2003 Penn State Engineering Society Outstanding Research Award
14. 2002-2003 MNE Department Head's Outstanding Faculty Award
15. Best Paper Award, Joint International Conference on Mathematical Methods and Supercomputing for Nuclear Applications, Saratoga Springs, NY, 1997
16. Fulbright Fellowship, 1993
17. IAEA Fellowship, 1995
18. NATO Advanced Institute Fellowship, 1993

## **SERVICE TO THE PROFESSION**

General Co-Chair, Conference on Nuclear Training and Education (CONTE 2023) - February 6-9, 2023

Member of Nuclear Science Committee (NSC) of the Nuclear Energy Agency (NEA), OECD  
2018 - present

Chair of Working Party on innovative issues of Reactor Systems (WPRS), Nuclear Science Committee (NSC), NEA/OECD, 2018 - present

Organizer and Coordinator of the IAEA HTGR Uncertainty Analysis in Modeling (UAM) Coordinated Research Program, 2015 - present

Nuclear Engineering Department Head Organization (NEDHO)

Member, 2015 – present

Chair elect – 2019, Member of Executive Committee of NEDHO – 2018- present

Member of Board of Managers (BOA) and Science and Technology (S&T) of INL, 2019 - 2021

Member of Advisory Board of Nuclear Energy Institute (NEI), 2019 - 2021

Member of Advisory Board of the Department of Nuclear Engineering at Texas A&M University  
2017 – present

Member of Advisory Board of the Nuclear Engineering Program at University of Florida  
2019 – present

Member of NCSU COE Executive Committee

August 2015 – present

General Co-chair of the 2020 Best-Estimate Plus Uncertainty (BEPU) International Conference (BEPU-2020)

2019 – 2020

Member, NEA OECD Expert Group on Multi-Physics Experimental Data, Benchmark, and Validation (EGMPEBV).

Member, NEA OECD Expert Group on Uncertainty Analysis in Modeling (EGUAM).

Scientific Advisory Committee for the Laboratory for Reactor Physics and Systems Behavior at the Paul Scherrer Institute, Switzerland

Member, 2012 – present

Consultative Scientific Council on Energy Resources and Energy Efficiency at the Bulgarian Academy of Sciences, Bulgaria

Member - September 2011- present

Scientific Advisory Committee of Division of Nuclear Energy and Safety (NES) at the Paul Scherrer Institute, Switzerland

Member, February 2017 – present

NINE Senior Advisory Group of NINE - Nuclear and Industrial Engineering S.r.l., Lucca, Italy

Member, 2017 - present

Editor-in-Chief

International Journal of Nuclear Energy Science and Engineering (IJNESE)

World Academic Publishing Company

2012 – present

Member of the Editorial Board

Science and Technology of Nuclear Installations

2006 – present

Chair of Scientific Board of the OECD/NEA Expert Group on LWR UAM

2007 - present

Member of International Expert Review Group on Attucha-2 Safety Analysis Report

2008 - 2013

Coordinator of IAEA CRP on HTR UAM

2012 – 2017

Member of OECD/NEA Working Party on Scientific Issues of Reactor Systems (WPRS),  
2010 - 2016

Member of ANS Reactor Physics Division Executive Committee  
2007 - 2010

Technical Co-Chair, PHYSOR-2010 Conference - Advances in Reactor Physics to Power the Nuclear Renaissance, Sheraton Station Square Hotel, Pittsburgh, Pennsylvania, USA, May 9-14, 2010.

Reviewer of DOE NEUP proposals in the area of multi-physics simulations  
October 2010 - April 2012

Member of Scientific Advisory Committee for the Laboratory for Reactor Physics and Systems Behavior at the Paul Scherrer Institute, Switzerland  
September 2012 – December 2017.

Member of Consultative Scientific Council on Energy Resources and Energy Efficiency at the Bulgarian Academy of Sciences, Bulgaria,  
September 2011- December 2016.

Expert Evaluator in Appointing an Associate Professor in Nuclear Reactor Safety at School of Engineering Science, Royal Institute of Technology, KTH, Sweden.  
September – November 2012.

## **INVITED GRADUATE COURSES AND LECTURES**

Seminar on Hi2Lo model information in Multi-physics Modeling and Simulations – Nuclear Engineering School, Purdue, March 2022.

Seminar of Multi-Physics Modeling and Simulations VVUQ – Nuclear Engineering Department, TAMU, February 2022.

Presented Invited Lecture at the University of Pretoria, South Africa, March 2019.

Invited Presentation on NEM core model for VVER-1000 simulator, Generic Pressurized Water Reactor Simulator (GPWR) User's Group Meeting, August 2014, Center for Advanced Engineering & Research, Forest, VA.

Seminar on AP1000® Activities at PSU in Cooperation with Westinghouse Related to Undergraduate and Graduate Education, Training and Research at INRNE, Bulgaria, July 2014.

Seminar at the Karlsruhe Institute of Technology (KIT) on Non-linear Iterative Methodologies for Embedded Transport Calculations of Reactors, Karlsruhe, Germany, May 22, 2014.

One Week Course on LWR Core Design and Fuel Management, AREVA Nuclear Professional School, Karlsruhe, Germany, May 2014.

Seminar on Multi-physics and Multi-scale Benchmarking and Uncertainty Quantification within NEA/OECD Framework, Argonne National Laboratory, April 23, 2014.

Seminar on SMR Core Design Optimization Methods, April 15, 2014, Holtec International, Marlton, NJ

Seminar on Advanced Deterministic and Stochastic Methods for Power Engineering Applications, Virginia Commonwealth University, February 10, 2014

Invited presentation at the Second National Congress on Physical Sciences and 41 National Conference on Physics Education Matters, Sofia, Bulgaria, 25 – 29 September, 2013.

One week course on Light Water Reactor core design and fuel management at the 2012 AREVA Nuclear Professional School, AREVA NP, Germany, December 2012.

One week course on Light Water Reactor (LWR) core feedback and transient response at the 2012 AREVA Nuclear Professional School, AREVA NP, Germany, December 2012.

One Week Course on LWR Core Design and Fuel Management within the AREVA Nuclear Professional School, AREVA NP, Germany, Fall 2011

One Week Graduate Course on Neutron Physics of Fission Reactors, Karlsruhe Institute of Technology, Germany, Fall 2011.

One Week Course on Cross-Section Generation and Nodal Core Modeling of VVER Reactors for Kozloduy NPP, Bulgaria at the Pennsylvania State University, Fall 2011.

One Week Graduate Course on Advanced Reactor Physics, North West University, South Africa, Fall 2011.

One Week Graduate Course on Reactor Physics and Theory, North West University, South Africa, Fall 2011.

One Week Graduate Course on Reactor Kinetics and Dynamics, Karlsruhe Institute of Technology, Germany, Spring 2011.

Invited Lecture on High-Fidelity Modeling for Nuclear Reactors, 2011 Frederik Joliot & Otto Hahn Summer School, Karlsruhe, Germany.

One Week Graduate Course on Advanced Reactor Physics, North West University, South Africa, Fall 2010.

One Week Graduate Course on Reactor Physics and Theory, North West University, South Africa, Fall 2010.

One Week Graduate Course on Multi-physics Multi-Scale Simulations, University of Polytechnic of Valencia, Spain, Summer 2010.

International Atomic Energy Agency (IAEA) Training Course on Neutronics, Thermal-Hydraulics and System Modeling Computer Codes, Ghana Atomic Energy Commission (GAES), National Nuclear Research Institute, Accra, Ghana, Fall 2010.

Short Course of Lectures on Reactor Physics Methods for Reactor Design and Safety Analysis, Siemens AG, Germany, Fall 2010.

Invited Lectures at the IAEA/ICTP Workshop on Nuclear Data for Advanced Reactor Technologies, Trieste, Italy, Fall 2010.

Graduate Course in High-Fidelity Multi-physics Simulations, University of Polytechnic of Valencia, Spain, Summer 2009.

Invited One Week of Lectures on Coupled Neutronics/Thermal-hydraulics Methodologies for Nuclear Reactor Design and Safety Analysis, NECSA, South Africa, Fall 2008

Invited 2 Lectures on Verification and Validation and Uncertainty Analysis in Multi-Physics Modeling, Verification and Validation for Nuclear System Analysis Workshop, INL, Summer 2008.

Graduate Course in Monte Carlo Methods and Applications in Nuclear Engineering, PBMR Ltd (Pty)/ESCOM, South Africa, Spring 2008

Graduate Course in Reactor Physics and Theory, Northwest University, South Africa, Spring 2008

Graduate Course in the Area of Reactor Kinetics/Dynamics and Uncertainty Analysis, PBMR Ltd (Pty),



South Africa, Summer 2007

Graduate Course in Multi-physics Multi-scale Reactor Analysis, University of Polytechnic of Valencia, Spain, Summer 2007.

Graduate Course in Monte Carlo Methods, Technical University of Munich, Germany, Fall 2006.

Invited Lecture on Coupled Neutronics/Thermal-Hydraulics Safety Analysis, 2006 Frederik Joliot & Otto Hahn Summer School, Cadarache, France.

Graduate Course in Coupled Best-Estimate Calculations and Associated Uncertainty Analysis, University of Polytechnic of Madrid, Spain, Summer 2006.

### **ADVISORY ACTIVITY**

Dr. Ivanov has graduated one hundred and six (106) MEng, sixty (64) MS and forty (45) PhD students. Currently he is advising 6 PhD and 2 MS students.

### **BOOKS & BOOK CHAPTERS**

M. Avramova, K. Ivanov, “*Design Basis Accident Analysis Methods for Light-Water Nuclear Power Plants*”, Chapter 11: LWR Reactivity Transients and Accidents, Modern Nuclear Energy Analysis Methods - Vol.3, Edited by R.P. Martin and C. Frepoli, World Scientific, Print ISSN: 25591-7854; Online ISSN: 2591-7862

### **JOURNAL PUBLICATIONS**

1. C. Takasugi, N. Martin, V. Laboure, J. Ortensi, K. Ivanov, M. Avramova, “Selective Partial Homogenization for Explicit Treatment of Strong Heterogeneities in Nodal Methods”, EPJ Nuclear Sciences & Technologies, Submitted Under Review, March 2022
2. G. Delipei, P. Rouxelin, A. Abarca, J. Hou, M. Avramova, K. Ivanov, “CTF-PARCS Core Multi-Physics Computational Framework for Efficient LWR Steady-State, Depletion and Transient Uncertainty Quantification”, ENERGIES, 7. <https://doi.org/10.3390/en15145226> (2022).
3. M. Altahhan, R. Geemert, M. Avramova, K. Ivanov, “Extending a low-order inhomogeneous adjoint equations model to a higher-order model with verification on integral applications”, Annals of Nuclear Energy, Volume 177, November 2022, 109277 (2022).
4. P. Rouxelin, A. Alfonsi, G. Strydom, M. Avramova, K. Ivanov, “Propagation of VHTRC manufacturing uncertainties with RAVEN/PHISICS”, Annals of Nuclear Energy, 1. <https://doi.org/10.1016/j.anucene.2021.108667> (2022).
5. M. Altahhan, R. Geemert, M. Avramova, K. Ivanov, “Development and verification of a higher-order mathematical adjoint nodal diffusion solver”, Annals of Nuclear Energy, 12. <https://doi.org/10.1016/j.anucene.2021.108548> (2021).
6. E. Ivanov, A. Sargeni, K. Ivanov, G. Bruna, “Evidence-based background for constrained uncertainty quantification in a core transient analysis”, Annals of Nuclear Energy, 12. <https://doi.org/10.1016/j.anucene.2021.108606> (2021).
7. Xu, Y., Hou, J., & Ivanov, K., “Methodology for Discontinuity Factors Generation for Simplified P-3 Solver Based on Nodal Expansion Formulation”, ENERGIES, 14(20), 6478. <https://doi.org/10.3390/en14206478> (2021).
8. J. Hou, M. Avramova, K. Ivanov, “Best-Estimate Plus Uncertainty Framework for Multiscale, Multiphysics Light Water Reactor Core Analysis”, Science and Technology of Nuclear Installations Volume 2020, Article ID 7526864, 18 pages, <https://doi.org/10.1155/2020/7526864> (2021).

9. G. Delipei, J. Hou, M. Avramova, P. Rouxelin, K. Ivanov, "Summary of comparative analysis and conclusions from OECD/NEA LWR-UAM benchmark Phase I", *Nuclear Engineering and Design*, 12. <https://doi.org/10.1016/j.nucengdes.2021.111474> (2021).
10. M. Avramova, A. Abarca, J. Hou, K. Ivanov, "Innovations in Multi-Physics Methods Development, Validation, and Uncertainty Quantification", *J. Nucl. Eng.* 2021, 2(1), 44-56; <https://doi.org/10.3390/jne2010005>, (2021).
11. I. Trivedi, J. Hou, G. Grasso, K. Ivanov, F. Franceschini, "Nuclear Data Uncertainty Quantification and Propagation for Safety Analysis of Lead-Cooled Fast Reactors", *Science and Technology of Nuclear Installations*, Volume 2020 | Article ID 3961095 | <https://doi.org/10.1155/2020/3961095> (2020).
12. P. Rouxelin, A. Alfonsi, K. Ivanov, G. Strydom, "Energy group search engine based on surrogate models constructed with the RAVEN/NEWT/PHISICS sequence", *Nuclear Engineering and Design*, 356. <https://doi.org/10.1016/j.nucengdes.2019.110356> (2020).
13. G. Nyalunga, V. Naicker, K. Ivanov, "Quantification and propagation of neutronics uncertainties of the Kozloduy-6 VVER-1000 fuel assembly using SCALE 6.2.1 within the NEA/OECD benchmark for uncertainty analysis in modelling of LWRs", *Annals of Nuclear Energy*, 133, 732–749. <https://doi.org/10.1016/j.anucene.2019.07.016> (2019).
14. Petruzzi, A., Ivanov, K., & Ivanov, E., "Selected papers from the 2018 Best Estimate Plus Uncertainty International Conference (BEPU 2018) Foreword", *Nuclear Technology*, Vol. 205, pp. III-IV. <https://doi.org/10.1080/00295450.2019.1676080> (2019).
15. K. Zeng, J. Hou, K. Ivanov, M. Jessee, "Uncertainty Quantification and Propagation of Multiphysics Simulation of the Pressurized Water Reactor Core", *Nuclear Technology*, Published online: 25 March 2019, Volume 205, 2019 - Issue 12: Selected papers from the 2018 Best Estimate Plus Uncertainty International Conference (BEPU 2018).
16. G. Nyalunga, V. Naicker, K. Ivanov, "Quantification and propagation of neutronics uncertainties of the Kozloduy-6 VVER-1000 fuel assembly using SCALE 6.2.1 within the NEA/OECD benchmark for uncertainty analysis in modelling of LWRs", *Annals of Nuclear Energy*, Volume 133, November 2019, Pages 732-749.
17. P. Rouxelin, G. Strydom, A. Alfonsi, K. Ivanov, "The IAEA CRP on HTGR uncertainties: Sensitivity study of PHISICS/RELAP5-3D MHTGR-350 core calculations using various SCALE/NEWT cross-section sets for Ex. II-1a", *Nuclear Engineering and Design*, Volume 329, 1 April 2018, Pages 156-166.
18. L. Wang, J. Guo, F. Li, J. Hou and K. Ivanov, "Effect of Nuclear Data on Fuel Element Neutronic Characteristics of Pebble-bed High Temperature Gas-cooled Reactor," *Atomic Energy Science and Technology*, 51, 9 (2017).
19. J. Hou, K. Ivanov, V. Boyarinov and P. Fomichenko, "OECD/NEA Benchmark for Time-Dependent Neutron Transport Calculations without Spatial Homogenization," *Nuclear Engineering and Design*, vol 317, pp. 177-189 (2017).
20. M. Avramova and K. Ivanov, "Multi-physics modeling of nuclear reactors", In *AccessScience*. McGraw-Hill Education. <https://doi.org/10.1036/1097-8542.YB150702>.
21. R. Pericas, K. Ivanov, F. Reventós, L. Batet, "Comparison of Best-Estimate Plus Uncertainty and Conservative Methodologies for a PWR MSLB Analysis Using a Coupled 3-D Neutron-Kinetics/Thermal-Hydraulic Code", *Nuclear Technology*, Volume 198, 2017 - Issue 2.

22. E. Georgieva, Y. Dinkov, K. Ivanov, "Benchmarking the Real-Time Core Model for VVER-1000 Simulator Application on Asymmetric Core Load", *ASME Journal of Nuclear Rad Science* 3(3), 031005 (May 25, 2017).
23. J. Hou, K. Ivanov, V. Boyarinov, P. Fomichenko, "OECD/NEA benchmark for time-dependent neutron transport calculations without spatial homogenization", *Nuclear Engineering and Design*, Volume 317, June 2017, Pages 177-189.
24. J. Shi, S. Levine, K. Ivanov, "New techniques for designing the initial and reload cores with constant long cycle lengths", *Annals of Nuclear Energy*, Volume 99, January 2017, Pages 165-173.
25. R. Bratton, M. Jessee, W. Wieselquist, K. Ivanov, "Rod Internal Pressure Distribution and Uncertainty Analysis Using FRAPCON", *Nuclear Technology*, Volume 197, Number 1, January 2017, Pages 47-63.
26. A. Bennett, M. Avramova, K. Ivanov, "Coupled MCNP6/CTF code: Development, testing, and application", *Annals of Nuclear Energy*, Volume 96, October 2016, Pages 1-11.
27. S. Thompson, K. Ivanov, "Advances in the Pennsylvania State University NEM code", *Annals of Nuclear Energy*, Volume 94, August 2016, Pages 251-262 (2016).
28. R. Pericas, K. Ivanov, F. Reventós, L. Batet, "Code improvement and model validation for Ascó-II Nuclear Power Plant model using a coupled 3D neutron kinetics/thermal-hydraulic code", *Annals of Nuclear Energy*, Volume 87, Part 2, January 2016, Pages 366-374.
29. F. Bostelmann, G. Strydom, F. Reitsma, K. Ivanov, "The IAEA coordinated research programme on HTGR uncertainty analysis: Phase I status and Ex. I-1 prismatic reference results", *Nuclear Engineering and Design*, Volume 306, September 2016, Pages 77-88.
30. D. Sahin, K. Unlü, K. Ivanov, "Neutronic Analysis of the PSBR Using a Burnup-Coupled MCNP Simulation with MURE", *Nuclear Technology*, Volume 194, Pages, June (2016).
31. T. Ngeleka, K. Ivanov, S. Levine, "Examination and refinement of fine energy group structure for high temperature reactor analysis", Volume 80, June 2015, Pages 279-292.
32. M. Avramova, K. Ivanov, T. Kozłowski, I. Pasichnyk, K. Velkov, E. Royer, A. Yamaji, J. Gilford, "Multi-physics and Multi-Scale Benchmarking and Uncertainty Quantification within NEA/OECD Framework", *Annals of Nuclear Energy*, Special Issue on Multi-Physics Modelling of LWR Static and Transient Behavior, Invited paper, *Annals of Nuclear Energy* Volume 84, October 2015, Pages 178-196, (2015).
33. A. Ivanov, V. Sanchez, R. Stieglitz, K. Ivanov, "Large-scale Monte Carlo neutron transport calculations with thermal hydraulic feedback", *Annals of Nuclear energy* Volume 84, October 2015, Pages 204-219, (2015).
34. S. Levine, T. Blyth, K. Ivanov, "Effect of changing enrichments on core performance", *Annals of Nuclear Energy*, Volume 75, January 2015, Pages 139-145, (2015).
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231. K. Ivanov, M. Manolova, T. Apostolov, "Multi-Level Optimization of Improved Coarse-Mesh Steady-State Diffusion Calculations in Hexagonal-Z Geometry", Proceedings of Joint International Conference on Mathematical Methods and Supercomputing in Nuclear Applications", 1:620-629. (1993).
232. T. Apostolov, K. Ivanov, R. Prodanova, "Improved Code System for Reactor Calculations and Validation for Advanced VVER Core Analysis", Proceedings of IAEA Specialist Meeting on Advanced Calculation Methods for Power Reactors and LWR Core Design Parameters, IAEA-TECDOC-678, 82-87 (1992).
233. T. Apostolov, K. Ivanov, M. Manolova, R. Prodanova, "HEXANES Code System for VVER In-Core Fuel Management Calculations and Loading Pattern Analyses", Proceedings of a Technical Committee Meeting on In-Core Fuel Management: Reloading Techniques, IAEA-TECDOC-816, 123-131 (1992).

234. K. Ivanov, T. Apostolov, M. Manolova, “HEXAB-3D - A Three-Dimensional Few-Group Coarse-Mesh Diffusion Code for Reactor Calculations”, Proceedings of International Topical Meeting on Advances in Mathematics, Computations, and Reactor Physics, 5 (30.2):10.1-10.6. (1991)

### **PATENTS, COPYRIGHTS, AND SOFTWARE SYSTEMS DEVELOPED**

“NCSU Advanced Thermal-Hydraulic Subchannel Code CTF” which was disclosed to the NCSU Office of Technology Transfer under Software Disclosure 16-249, 2016.

“North Carolina State University (NCSU) Nodal Neutronics Simulator NEM” which was disclosed to the NCSU Office of Technology Transfer under Software Disclosure No. 2021-090, 2021.

### **SOFTWARE SYSTEMS DEVELOPED**

1. CTF/MCNP-6—Coupled sub-channel thermal-hydraulics/Monte Carlo neutronics code system – 2014.
2. MICXN – lattice physics code for fast gas cooled reactors – 2013.
3. Coupled DeCART/COBRA-TF/BISON multi-physics analysis tool for high-fidelity calculations – 2013.
4. ITTM code – Iterative Transport ( $P_n$ ) Transport (MOC) Software for prismatic HTR core analysis – 2013.
5. Hierarchical multi-level CFD-based solver for HTR applications using OpenFOAM platform - 2013.
6. ITDM code - Iterative diffusion transport software - code for multi-group heterogeneous transport calculations – 2012.
7. MOC Code - 2-D Method of Characteristics code for lattice physics calculations – 2011.
8. RSM Code - Resonance scattering modeling for multi-group deterministic codes – 2011.
9. Diffusion/SP<sub>3</sub> OpenFoam coupled code - OpenFOAM framework as a tool for HTR multi-physics analysis – 2010.
10. MCNP/CTF/NEM/NJOY - Coupled code system for high-fidelity reference core calculations - 2010.
11. MCOR – Monte Carlo Based Depletion code for LWRs – 2010.
12. ML/TL Generator Code - Software for development of 3-D cross-section master and transient libraries for LWRs – 2008.
13. PSU-FEM - Finite Element Method Diffusion and SP<sub>3</sub> High-Fidelity Neutronics Code – 2008.
14. DORT-TD/THERMIX - A Time-Dependent Neutron Transport Theory Code Coupled with Thermal Hydraulics Code THERMIX – 2007.
15. CTF/NEM - Coupled COBRA-TF/NEM Code for Multi-Physics and Multi-Scale Reactor Analysis – 2007.
16. AFMANCC/MDLP Code Package - Code Package for Three-Dimensional Out-of-Phase Stability Analysis – 2006.
17. TRIGSIMS - Improved Monte Carlo based code package for core depletion calculations of the PSU TRIGA research reactor – 2006.
18. GARCO - Genetic Algorithm optimization package for loading pattern and burnable poison placement optimization – 2006.

19. PSU-COBRA-TF - Thermal-hydraulics sub-channel code for standalone and coupled calculations – 2005.
20. Coupled NEM/THERMIX-DIREKT computer code system - Developed for coupled safety calculations of advanced HTGRs – 2004.
21. NEM/BEM SP<sub>3</sub> code - The code couples the high-order transport model BEM with the nodal multi-group core simulator NEM for analysis of MOX cores and advanced reactors – 2004.
22. ADMARC-H - Hexagonal multi-dimensional nodal fuel management code. Developed at PSU in 1995.
23. HEXAB-3D - advanced three-dimensional few-group reactor analysis code, based on an innovative non-linear nodal method in 3D hexagonal geometry and an efficient solution scheme. Developed at INRNE, Sofia, Bulgaria in 1991.

### SYNERGISTIC ACTIVITIES

American Nuclear Society, 1993-Present

American Society of Mechanical Engineers, 1998-Present

European Nuclear Society, 1991-Present

New York Academy of Sciences, 1994-Present

### RECORD IN PARTICIPATION IN SEMINARS AND WORKSHOPS

Thirteen Workshop on Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Uncertainty Analysis in Modeling (UAM-13) Benchmark, ORNL, USA	May 2019	OECD/NEA	Organizer, Presenter
Fourth Workshop on Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Time-Dependent Neutron Transport (C5-G7-TD) Benchmark Meeting	May 2019	OECD/NEA	Organizer, Presenter
EGMPEBV, NEA/OECD Kick-off Workshop on TVA WB1 Multi-Physics Multi-Cycle Benchmark, ORNL, USA	May 2019	OECD/NEA	Organizer, Presenter
EGMPEBV, NEA/OECD	June 2019	OECD/NEA	Organizer,

Second Multi-Physics Model Validation Workshop, GRS, Germany			Presenter
First Expert Group on Multi-physics Experimental Data, Benchmarking and Validation (EGMPEBV) Meeting	September 2014	OECD/NEA	Presenter
Prismatic Coupled Neutronics/Thermal Fluids Transient of the MHTGR-350 MW Core Design – Second Workshop	November 2014	OECD/NEA	Presenter
OECD UAM-8 Benchmark Workshop	May 2014	OECD/NEA	Organizer Presenter
OECD/NRC Oskarshamn-2 BWR Stability Third Benchmark Workshop	May 2014	OECD/NEA	Presenter
Second IAEA CRP Meeting on HTR UAM, Vienna, Austria	December 2014	IAEA	Presenter
First IAEA CRP Meeting on HTR UAM, Vienna, Austria	September 2013	IAEA	Presenter
Seminar at HOLTEC International on PSU activities in reactor physics and multi-physics	April 2013	HOLTEC	Presenter
Seminar at ORNL, USA on Uncertainty Analysis in Modeling	April 2013	ORNL	Organizer Presenter
OECD UAM-7 Benchmark Workshop	April 2013	OECD/NEA	Organizer Presenter
OECD Kalinin-3 Fifth Benchmark Workshop	April 2013	OECD/NEA	Organizer Presenter
OECD/NRC Oskarshamn-2 BWR Stability Second Benchmark Workshop	April 2013	OECD/NEA	Presenter
Seminar at NECSA, South Africa on ITDM	March 2013	NECSA, South Africa	Presenter

## Methodology

Seminar at KTH on Introduction to PSU activities in reactor physics and multi-physics	December 2012	KTH, Sweden	Presenter
Seminar at Westinghouse, Vasteras with 3 lectures on State-of-the-art in Coupled Reactor Simulations, Uncertainty Quantification in Reactor Analysis, and Next Generation Methods for Reactor Design	December 2012	Westinghouse, Vasteras, Sweden	Presenter
Invited Presentation at the Scientific Session devoted to 40 years INRNE, BAS, Bulgaria – Multi-Physics and Multi-Scale Benchmarking and Uncertainty Quantification for LWR Design and Safety Analysis	October 2012	Bulgarian Academy of Sciences	Presenter
Seminar at Chalmers University on High Fidelity Calculations in Reactor Analysis, Sweden	September 2012	University of Chalmers	Presenter
Seminar at University Polytechnic of Catalonia, Spain - Multi-Physics Simulations with Uncertainty Quantification in Support of LWR Analysis	June 2012	University Polytechnic of Catalonia	Presenter
Invited Lecture on Coupled Neutronics/Thermal-Hydraulic Codes at THICKET-3 Seminar on Transfer of Competence, Knowledge and Experience Gained through CSNI Activities in the Field of Thermal-	June 2012	NEA/OECD	Presenter

## Hydraulics

OECD UAM-6 Benchmark Workshop	May 2012	OECD/NEA	Organizer Presenter
OECD Kalinin-3 Fourth Benchmark Workshop	May 2012	OECD/NEA	Organizer Presenter
OECD/NRC Oskarshamn-2 BWR Stability First Benchmark Workshop	May 2012	OECD/NEA	Organizer Presenter
Kick-of IAEA CRP Meeting on HTR UAM, ORNL, Oak Ridge, USA	April 2012	IAEA, ORNL	Organizer Presenter
Seminar at GRS, Germany on Iterative High-Order Low-Order Reactor Analysis Methodologies	December 2011	GRS, Germany	Presenter
OECD Kalinin-3 Third Benchmark Workshop	April 2011	OECD/NEA	Organizer Presenter
OECD UAM-5 Benchmark Workshop	April 2011	NEA/OECD	Organizer Presenter
OECD/NRC Oskarshamn-2 BWR Stability Start-up Benchmark Meeting	April 2011	NEA/OECD	Organizer Presenter
IAEA 3rd Consultancy Meeting to prepare for the CRP on HTGR Reactor Physics, Thermal-Hydraulics and Depletion Uncertainty Analysis, Vienna, Austria	July 2011	IAEA	Organizer Presenter
IAEA 2nd Consultancy Meeting to prepare for the CRP on HTGR Reactor Physics, Thermal-Hydraulics and Depletion Uncertainty Analysis, Prague, Czech Republic	October 2010	IAEA	Organizer Presenter
Seminar at NASA, Argentina on the Generation of Cross- section Libraries for	August 2010	NASA, Argentina	Presenter

Atucha-2 NPP Transient Simulations

IAEA 1st Consultancy Meeting to prepare for the CRP on HTGR Reactor Physics, Thermal-Hydraulics and Depletion Uncertainty Analysis, Vienna, Austria	June 2010	IAEA	Organizer Presenter
Second International Verification and Validation for Nuclear Systems Analysis Workshop, Myrtle Beach, South Carolina	May 2010	Center of Advance Energy Studies; Idaho National Laboratory; Idaho State University; North Carolina State University	Presenter
OECD Kalinin-3 Second Benchmark Workshop	May 2010	OECD/NEA	Organizer Presenter
OECD UAM-4 Benchmark Workshop	May 2010	NEA/OECD	Organizer Presenter
OECD Kalinin-3 First Benchmark Workshop	April 2009	NEA/OECD	Organizer Presenter
OECD UAM-3 Benchmark Workshop	April 2009	NEA/OECD	Organizer Presenter
Seminar at University of Pisa, Italy on Validation of Cross-Section Generation for Atucha-2	November 2008	University of Pisa	Presenter
Seminar at NECSA, South Africa on Coupled Core Methods	November 2008	NECSA	Presenter
Seminar at AREVA NP, Lynchburg on Multi-Scale Coupled Simulations	November 2008	AREVA NP	Presenter
Seminar at AREVA NP, Erlangen on Neutronics Related Activities at RDFMG	October 2008	AREVA NP	Presenter
Two Invited Presentations at the INL/DOE V&V of Nuclear System Analysis Workshop	July 2008	INL/DOE	Presenter
Invited Presentation at			

the 2008 German Annual Meeting of Nuclear Technology on Multi-physics Simulations	May 2008	German Nuclear Society	Presenter
PBMR/ESKOM Capacity Building Short Course on Monte-Carlo Methods and Applications	May 2008	PBMR (Pty) Ltd, South Africa	Lecturer
Seminar at the University of Karlsruhe on Multi-physics Multi-scale Methodologies	May 2008	University of Karlsruhe, Germany	Presenter
OECD UAM-2 Benchmark Workshop	April 2008	NEA/OECD	Organizer and Lecturer
OECD/NRC BFBT-5 Benchmark Workshop	April 2008	US NRC and NEA/OECD	Organizer and Lecturer Organizer and Lecturer
Fourth OECD PBMR-400 Coupled Code Benchmark Workshop (PBMR-4)	January 2008	NEA, OECD	Presenter
Seminar at NA-SA/ARN Meeting, Buenos Aeries, Argentina on Cross-Section Generation for Atucha-2 NPP	December 2007	NA-SA	Presenter
Seminar at Westinghouse, Vasteras, Sweden on NEM/CTF system	November 2007	Westinghouse	
Seminar at AREVA NP, Erlangen, Germany on Coupled Monte Carlo/COBRA-TF Calculations	November 2007	AREVA NP	Presenter
Seminar at GRS, Munich on Embedded Transport Calculations	November 2007	GRS	Presenter
Seminar on Uncertainty and Sensitivity Analysis	July-2007	PBMR (Pty) Ltd, South Africa	Presenter
One-week Seminar within the UPV, Valencia, Spain PhD Program entitled "Nuclear Technology and Safety"	June 2007	Ministry of Education and Science (MEC), Spain	Lecturer



PBMR Capacity Building Short Course on Reactor Kinetics and Dynamics	August 2007	PBMR (Pty) Ltd, South Africa	Lecturer
Invited Key Note Presentation for Track 11 at ICAPP-2007 Conference	May 2007	Conference Technical Committee	Presenter
OECD/DOE/CEA V1000CT-5 Benchmark Workshop	January 2007	OECD, US DOE and CEA	Organizer and Lecturer
OECD Uncertainty Analysis in Modeling Workshop (UAM-1)	May 2007	NEA, OECD	Organizer and Lecturer
OECD/NRC BFBT-4 Benchmark Workshop	May 2007	US NRC and NEA, OECD	Organizer and Lecturer
VVER-440 Cross-Section Workshop	April 2007	US DOE	Organizer and Lecturer Presenter
Seminar at CEA-Saclay on Data for Coupled code Systems	January 2007	CEA	
Seminar at FZK, Karlsruhe on High-fidelity Multi-level Methods for Nuclear Reactor Analysis	November 2007	FZK	Presenter
Third OECD PBMR-400 Coupled Code Benchmark Workshop (PBMR-3)	January 2007	NEA, OECD	Organizer and Lecturer
Seminar at AREVA NP, Erlangen, Germany	November 2006	AREVA NP	Presenter
Seminar at GRS, Munich, Germany	October 2006	GRS	Presenter
Seminar at Technical University of Munich, Germany	October 2006	TUM	Presenter
2006 Frederik Joliot & Otto Hahn Summer School, Cadarache, France	August 2006	CEA, France and FZK, Germany	Lecturer
One-week Seminar within the UPM PhD Program entitled "Science and Technology	May 2006	Ministry of Education and Science (MEC), Spain	Lecturer

of Nuclear Energy"

OECD/DOE/CEA V1000CT-4 Benchmark Workshop	April 2006	OECD, US DOE and CEA	Organizer and Lecturer
OECD/NRC BFBT-3 Benchmark Workshop	April 2006	US NRC and NEA, OECD	Organizer and Lecturer
OECD Uncertainty Analysis in Modeling Workshop (UAM-2006) Workshop	April 2006	NEA, OECD	Organizer
PSU Nuclear Engineering Seminar	December 2005	Department of Mechanical and Nuclear Engineering, PSU	Presenter
Second OECD PBMR- 400 Coupled Code Benchmark Workshop (PBMR-2)	January 2006	NEA, OECD	Organizer and Lecturer
Workshop on RELAP-3D Capability	August 2005	US DOE	Organizer and Lecturer
First OECD PBMR-400 Coupled Code Benchmark Workshop (PBMR-1)	June 2005	NEA, OECD	Organizer and Lecturer
OECD/NRC BFBT-2 Benchmark Workshop	June 2005	US NRC NEA, OECD	Organizer and Lecturer
OECD/DOE/CEA V1000CT-3 Benchmark Workshop	April 2005	OECD, US DOE and CEA	Organizer and Lecturer
PBMR-268 Coupled Code Benchmark Workshop	March 2005	NRG/PBMR/PSU	Organizer and presenter
OECD/DOE/CEA V1000CT-2 Benchmark Workshop	April 2004	OECD, US DOE and CEA	Organizer and Lecturer
FISA Workshop on EC- US Cooperation in Nucl. Education and Safety Research	November 2003	EC	Organizer and Lecturer
UC/OSU Nuclear Engineering Seminar	October 2003	OSU	Presenter
3 <sup>rd</sup> CRISSUE-S Meeting	June 2003	EC/DOE	Presenter

VVER Cross-Section Workshop	May 2003	ANL/DOE, INSP	Organizer and Lecturer
14 <sup>th</sup> Meeting on the Physics of Pu Fuels and Innovative Fuel Cycles	May 2003	OECD/NEA	Presenter
1 <sup>st</sup> DOE/OECD/CEA V1000CT Workshop	May 2003	OECD/DOE/CEA	Organizer and Lecturer
5 <sup>th</sup> OECD/NRC BWR TT Workshop	January 2003	OECD/NRC	Organizer and Lecturer
Department of NE University of Illinois at Urbana-Champaign Seminar	November 2002	University of Illinois at Urbana-Champaign	Presenter
4 <sup>th</sup> OECD/NRC BWR TT Workshop	October 2002	OECD/NRC	Organizer and Lecturer
NEA/OECD 2 <sup>nd</sup> CRISSUE-S Meeting	September 2002	EC/DOE	Presenter
INRNE, Sofia US DOE VVER Safety Meeting	August 2002	US DOE	Organizer and Lecturer
Starter OECD/DOE VVER Workshop	May 2002	OECD/DOE	Organizer and Lecturer
3 <sup>rd</sup> OECD/NRC BWR TT Workshop	May 2002	OECD/NRC	Organizer and Lecturer
Westinghouse ABB Seminar	May 2002	Westinghouse ABB	Presenter
Polytechnic of Turin Seminar	February 2002	Polytechnic of Turin Dipartimento Nucleare	Presenter
University of Pisa, Italy CRISSUE-S Meeting	February 2002	EC/DOE	Presenter
FZK, Karlsruhe Seminar	October 2001	Institute for Safety Research	Presenter
2 <sup>nd</sup> OECD/NRC BWR TT Workshop	October 2001	OECD/ NRC	Organizer and Lecturer
CEA, Sac lay, France Seminar	October 2001	CEA	Presenter
First Cook NPP, USA Seminar	December 2001	First Cook NPP	Presenter
ANL- East Seminar	June 2001	ANL	Presenter

Department of NE, Purdue University Seminar	February 2001	Purdue University	Presenter
1 <sup>st</sup> OECD/NRC BWR TT Workshop	November 2000	OECD/ NRC	Organizer and Lecturer
4 <sup>th</sup> OECD/NRC MSLB Workshop	January 2000	OECD/ NRC	Organizer and Lecturer
3 <sup>rd</sup> OECD/NRC MSLB Workshop	March 1999	OECD/ NRC	Organizer and Lecturer
Ad-Hoc Meeting on MSLB Benchmark	September 1999	OECD/ NRC	Organizer and Lecturer
TRAC Users' Meeting Allentown, PA, USA	June 27-30, 1999	TRAC User Group	Organizer and Lecturer
2 <sup>nd</sup> OECD/NRC MSLB Workshop	June 1998	OECD/ NRC	Organizer and Lecturer
1 <sup>st</sup> Kinetics Workshop Parsippany, NJ	March 1997	TRAC User Group	Organizer and Lecturer
1 <sup>st</sup> OECD/NRC MSLB Workshop	April 1997	NRC/ OECD	Organizer and Lecturer
Department of NE, PSU Seminar	December, 1996	NE Department, PSU	Presenter

## **RESEARCH PROJECT RECORD**

### **North Carolina State University since 2015**

Total external funding: about \$10,000,000

Total pending proposals: about \$2,000,000

### **CURRENT AND CONTINUED:**

**US DOE - NEUP**, “Integral Benchmark Evaluation of Zero-Power Tests and Multi-Cycle Depletion Experimental Data of Tennessee Valley Authority Watts Bar Unit 1”

October 2021 – September 2024

Lead PI: K. Ivanov (NCSU)

Co-PI: M. Avramova (NCSU)

**BWX Technologies** “BWXT Small Mobile Nuclear Reactor (SMNR) Program Phase 1B for North Carolina State University (NCSU)”

April 2021 – June 2022

Lead PI: K. Ivanov (NCSU)

Co-PI: M. Avramova (NCSU)

**US DOE - NEUP**, “Benchmark Evaluation of Transient Multi-Physics Experimental Data for Pellet Cladding Mechanical Interactions”

October 2020 – September 2023

Lead PI: Maria Avramova (NCSU)

Co-PI: Kostadin Ivanov (NCSU)

**BWX Technologies**, “Input to the Preliminary PIRT report”

March 2020 – December 2021

Lead PI: K. Ivanov (NCSU)

Co-PI: M. Avramova (NCSU)

**NECSA**, “Research Activities in the Field of Development and Coupling COBRA-TF Code Version for Research and Power Reactors.”

January 2016 - December 2023

Lead PI: Maria Avramova (NCSU)

Co-PI: Kostadin Ivanov (NCSU)

**US DOE – NEUP**, “Fellowship and Scholarship Support for North Carolina State University”  
2021-2033

Lead PI: Kostadin Ivanov (NCSU)

**US NRC**, “Faculty Development Program in Nuclear Engineering at North Carolina State University”

July 2019 – July 2022

Lead PI: Kostadin Ivanov (NCSU)

Co-PI: Mohamed Bourham (NCSU)

**ORNL -UT-Battelle LLC**, “Joint Faculty Appointment between Oak Ridge National Laboratory and NC State University for Dr. Scott Palmtag”

09/08/2020- 09/30/2023

Lead PI: Kostadin Ivanov (NCSU)

**Battelle Energy Alliance, LLC – INL**, “Joint Faculty Appointment between Battelle Energy Alliance and North Carolina State University for Dr. Benjamin Beeler”

10/20/2021 - 09/30/2023

Lead PI: Kostadin Ivanov (NCSU)

**ORNL -UT-Battelle LLC**, “Joint Faculty Appointment between Oak Ridge National Laboratory and NC State University for Dr. Igor Bolotnov”

8/22/22 - 8/21/24

Lead PI: Kostadin Ivanov (NCSU)

**X-Energy:**, “Advanced Operation & Maintenance Techniques Implemented in the Xe-100 Plant Digital Twin to Reduce Fixed O&M Cost (TT&O Year 1)(ARPA E WP 7.1)”

11/30/2020 - 03/31/2023

Lead PI: Maria Avramova (NCSU)

Co-PI: Kostadin Ivanov (NCSU)

**ORNL -UT-Battelle LLC**, “Joint Faculty Appointment between Oak Ridge National Laboratory and NC State University for Dr. Igor Bolotnov”

08/22/2022 – 08/21/2024

Lead PI: Kostadin Ivanov (NCSU)

**Savannah River National Lab (SRNL)**, “Joint Faculty Appointment with Savannah River National Lab( Robert Hayes)”

07/20/2022 - 07/19/2023

Lead PI: Kostadin Ivanov (NCSU)

X-Energy, LLC (Prime- US Dept. of Energy (DOE)), “Master Agreement – Advanced Reactor Demonstration Program (ARDP) Support Project”

02/02/2021 - 07/19/2023

Lead PI: Kostadin Ivanov (NCSU)

**Battelle Energy Alliance, LLC – INL**, “Joint Faculty Appointment between Battelle Energy Alliance and North Carolina State University for Dr. Sebastian Schunert”

05/01/2020 - 09/30/2025

Lead PI: Kostadin Ivanov (NCSU)

**PENDING:**

**Savannah River National Lab (SRNL)**, “Joint Faculty Appointment with Savannah River National Lab (John Mattingly)”

Lead PI: Kostadin Ivanov (NCSU)

**Idaho National Laboratory (was Idaho National Engineering Lab)**, “Develop a Multi-Physics Model for the MARVEL Micro-reactor”

Lead PI: Kostadin Ivanov (NCSU)

**BWXT Advanced Technologies LLC (Prime -US Dept. of Defense (DOD))**, “BWXT Small Mobile Nuclear Reactor (SMNR) Program Phase 2 for North Carolina State University (NCSU)

Lead PI: K. Ivanov (NCSU)

Co-PI: M. Avramova (NCSU)

**COMPLETED:**

**US DOE – NEUP**, “Fellowship and Scholarship Support for North Carolina State University”

2015-2021

Lead PI: Kostadin Ivanov (NCSU)

**ORNL -UT-Battelle LLC**, “Joint Faculty Appointment between Oak Ridge National Laboratory and NC State University for Dr. Igor Bolotnov”

02/28/2011- 09/30/2018

Lead PI: Kostadin Ivanov (NCSU)

**US NRC**, “North Carolina State University's Graduate Fellowship in Nuclear Engineering (NCSU-GFINE)”

08/01/2013 - 07/31/2019

Lead PI: Kostadin Ivanov (NCSU)

**ORNL -UT-Battelle LLC**, “Joint Faculty Appointment between Oak Ridge National Laboratory and NC State University for Dr. Nam Dinh”

02/01/2013- 09/30/2018

Lead PI: Kostadin Ivanov (NCSU)

**ORNL -UT-Battelle LLC**, “Joint Faculty Appointment between Oak Ridge National Laboratory and NC State University for Dr. Robert Hayes”

11/02/2015- 09/30/2020

Lead PI: Kostadin Ivanov (NCSU)

**BNL (Prime--US DOE)**, “Develop Educational program in VVUQ - Multiphysics”

November 2018 - December 2020

Lead PI: Maria Avramova (NCSU)

Co-PI: Kostadin Ivanov (NCSU)

**National Nuclear Regulator, South Africa**, “Multi-physics Platform For Safety Analysis Based On NRC Codes Improved Estimates Of Local Safety Parameters For Efficient Evaluation Of Realistic Safety Margins For Real-size Reactor Core Modeling”

April 2018 - March 2021

Lead PI: Maria Avramova (NCSU)

Co-PI: Kostadin Ivanov (NCSU)

**ORNL-UT Battelle**, “Participation in the MPEBV Efforts with the NEA”

January 2016 - September 2020

Lead PI: Maria Avramova (NCSU)

Co-PI: Kostadin Ivanov (NCSU)

**ORNL-UT Battelle**, “Joint Faculty Appointment Between Oak Ridge National Laboratory (ORNL) and NC State University (NCSU) for Dr. David Kropaczek”

April 2016 – May 2018

Lead PI: Kostadin Ivanov (NCSU)

**US NRC**, “North Carolina State University’s Graduate Fellowship in Nuclear Engineering (NCSU–GFINE)”

\$400,000, August 2016 – July 2019

Co-PI (50%)

**DOE NEUP/PSU**, “Three-Dimensional Fuel Pin Model Validation by Prediction of Hydrogen Distribution in Cladding and Comparison with Experiment”

May 2014- May 2017

Lead PI: Maria Avramova (NCSU)

Co-PI: Kostadin Ivanov (NCSU)

**Battelle Energy Alliance, LLC – INL**, “Participation in IAEA Coordinated Research Program on HTGR Uncertainty Analysis in Modeling”

December 2015 – September 2018

Lead PI: Kostadin Ivanov (NCSU)

**US NRC**, “North Carolina State University's Graduate Fellowship In Nuclear Engineering (NCSU GFINE)”

August 2013 - July 2019

Lead PI: K-L Murty (NCSU)

Co-PI: Kostadin Ivanov (NCSU)

**US NRC**, “Faculty Development Program in Nuclear Engineering at North Carolina State University”  
June 2017 – June 2020

Lead PI: Kostadin Ivanov (NCSU)

Co-PI: Mohamed Bourham (NCSU)

**Battelle Energy Alliance, LLC – INL**, “Nuclear Energy Knowledge and Validation Center (NEKVac)”  
December 2016 – September 2017

Lead PI: Kostadin Ivanov (NCSU)

**ORNL -UT-Battelle LLC**, “Joint Faculty Appointment between Oak Ridge National Laboratory and NC State University for Dr. Igor Bolotnov”

02/15/2019 - 09/30/2019

Lead PI: Kostadin Ivanov (NCSU)

**Battelle Energy Alliance, LLC – INL**, “Development of Simulation Capabilities and Validation Basis to Support Evaluation of Advanced Nuclear Fuel Concepts”

10/01/2020 – 03/11/2022

Lead PI: Jason Hou

Co-PI: Kostadin Ivanov (NCSU)

**Battelle Energy Alliance, LLC – INL**, “Joint Faculty Appointment between Battelle Energy Alliance and North Carolina State University for Dr. Benjamin Beeler”

9/23/19 - 9/30/21)

Lead PI: Kostadin Ivanov (NCSU)

**CNP – Southern Company**, “Multi-physics Modeling of Fast Spectrum Liquid Fuel MSRs, Consortium for Nuclear Power (CNP) Core Project # 1”

07/01/2018 - 06/30/2022

Lead PI: Maria Avramova (NCSU)

Co-PI: Kostadin Ivanov (NCSU)

**CNP – Framatome Inc**, “Advanced Nodal Codes Scientific Developments Regarding Efficiency and Numerical Stability Improvement, CNP Core Project #4”

07/01/2018 - 06/30/2022

Lead PI: Maria Avramova (NCSU)

Co-PI: Kostadin Ivanov (NCSU)

**Battelle Energy Alliance, LLC – INL**, “Release No. 3 Under Blanket Master Contract No. 161615 Energy Alliance, LLC (BEA)”

12/06/2018 - 09/30/2021

Lead PI: Kostadin Ivanov (NCSU)

**X-Energy, LLC (Prime- US Dept. of Energy (DOE))**, “Teaming Agreement with X-ENERGY”

06/22/2020 - 06/22/2021

Lead PI: Kostadin Ivanov (NCSU)

***SUMMARY OF DR. IVANOV RESEARCH CONTRACTS AND GRANTS AT PSU (TOTAL EXTERNAL FUNDING OF ABOUT \$15,000,000):***

1. “NANT Fellowship Award”, PI, (100%), August 2015 – April 2016



2. "Graduate Fellowship Program in Nuclear Engineering", US NRC, PI, (100%), August 2015 – July 2019
3. "Nuclear Energy Knowledgeable and Validation Center - Initial Integration Support," INL-Battelle, Co-Principal Investigator (Co-PI, 50%), January 2015 – September 2015
4. "Neutronics and Core Thermal-Hydraulic Design of SMR-160," Holtec International August 2014- May 2016.
5. "Three-dimensional fuel pin model validation by prediction of hydrogen distribution in cladding and comparison with experiment", US DOE / NEUP, May 2014 – April 2017.
6. "CTF User's Group", Members of CTF User's Group, September 2014 – October 2017.
7. "Nuclear Engineering Computational Simulation Laboratory (NECSL)," Generic Pressurized Water Reactor (GPWR) simulator to support Nuclear Engineering instructional, training, research and innovation activities, COE Instructional and Research Equipment Grants. September 2014- May 2015.
8. "Fuel Rod Internal Gas Pressure Uncertainty Analysis", ORNL-Battelle, November 2014 – September 2015.
9. May 2013 - December 2013, "Physics Support – Reactor Core Physics Analysis System for the EM2 Program", General Atomics.
10. "Integration of COBRA-TF (CTF) into CASL - VERA (Virtual Environment for Reactor Analysis)", ORNL/DOE, March 2012 - November 2014.
11. CTF Coupling Enhancements – Sponsored by South African Nuclear Energy Corporation (NECSA), South Africa, November 2012 - December 2017.
12. Anisotropic azimuthal power and temperature distribution on fuel rod: impact on hydride distribution", US DOE / NEUP / Battelle - Idaho National Laboratory, September 2011 - August 2014.
13. "Physics Support – Reactor Core Physics Analysis System for the EM2 Program", General Atomics, PI, May 2013 - December 2013.
14. Inline Lattice Calculations and Development of Thermal Fluid Homogenization Techniques for Prismatic HTGR Simulation -Phase II, INL/Battelle, June 2012 – August 2015.
15. May 2012 - April 2013, "Improvements to MICROX-2 Lattice Physics Code," General Atomics.
16. Inline Lattice Calculations and Development of Thermal Fluid Homogenization Techniques for Prismatic HTGR Simulation - Phase I, INL/Battelle, November 2010 - May 2012.
17. Uncertainty Analysis in Best Estimate Modeling (UAM) for Design, Operation and Safety Analysis of LWRs, US NRC, December 2009-December 2014.
18. Iterative Transport-Diffusion Method for LWR Analysis, UM/US NRC, September 2012- August 2014.
19. August 2011 – July 2014, "Verification and Validation of Neutronics Codes", Toshiba-Westinghouse.
20. April 2011 - December 2011, "NEM Core Simulation Grant," Risk Engineering Ltd, Bulgaria.
21. May 2010 – April 2014, "Toshiba-Westinghouse Undergraduate Research Summer Student Support".

22. September 2010 - August 2012, "Analysis of Oskarsham-2 Stability Event," UM/US NRC.
23. November 2010 - May 2012, "Inline Lattice Calculations and Development of Thermal Fluid Homogenization Techniques for Prismatic HTGR Simulation - Phase I", INL/Battelle.
24. August 2010 - December 2011, "Energy Multiplier Module (EM2) Physics Support - Library," General Atomics.
25. NGM Feasibility Study, Westinghouse Electric Company, March 2006-August 2014.
26. OECD/NRC PWR Sub-channel and Bundle Tests (PSBT) Benchmark, Sponsored by the US Nuclear Regulatory Commission (US-NRC) and the *Nuclear Energy Agency (NEA)* of the Organization for Economic Co-operation and Development (OECD), September 2009-August 2011.
27. Coupling of M-COBRA-TF with RELAP5-3D, Sponsored by Mitsubishi Heavy Industries, Ltd., Japan, February 2009 - March 2010.
28. M-COBRA-TF Spacer Grid Model Implementation, Sponsored by Mitsubishi Heavy Industries, Ltd., Japan, July 2009 - March 2010.
29. M-COBRA-TF Spacer Grid Model Assessment, Sponsored by Mitsubishi Heavy Industries, Ltd., Japan, July 2009 - March 2010.
30. Development of COBRA-TF for Stand-alone and Coupled Calculations, AREVA NP, Germany (Co-PI, 10%) 2009-2012.
31. Electric Power Research Institute (EPRI) Nestor Project, Sponsored by EPRI, January 2009 - June 2013.
32. CTF Development and Coupling, Sponsored by South African Nuclear Energy Corporation (NECSA), South Africa, October 2008 - August 2009.
33. September 2009 - September 2012, "Effect of the Resonance Scattering Model on Reactor Core Neutronics Calculations for High-Burnup Studies," DOE.
34. January 2009 - December 2012, "Development of COBRA-TF for Stand-Alone and Coupled Calculations – Phase II," AREVA NP, Germany.
35. January 2009 - December 2011, "Sensitivity Study on the Energy Group Structure for HTR Analysis - Phase II," INL.
36. January 2009 - February 2011, "Optimization of Coupled Neutronics/Thermal-Hydraulics Methodology for Safety Analysis of PBMR – Phase II," NNR/PBMR.
37. September 2009 - December 2011, "Sensitivity Study on the Energy Group Structure for HTR Analysis - Phase II," INL.
38. September 2009 - December 2011, "OECD/NRC PSBT Benchmark," US NRC.
39. February 2009 - March 2010, "Coupling of COBRA-TF with RELAP5-3D," MHI, Japan.
40. July 2009 - March 2010, "COBRA-TF Model Assessment," MHI, Japan.
41. September 2008 – August 2017, "OECD/NEA LWR UAM Benchmark Development and Coordination", OECD/NEA.
42. September 2008 - September 2011, "Development of MOC Solver for Advanced Fuel Designs," PBMR (Pty) Ltd/Westinghouse.
43. December 2008 - September 2011, "LFP, Decay Heat and Scattering Kernels for Deep Burn Fissile, Fissionable and Minor Actinides," Battelle/INL.

44. October 2008 - March 2010, "Reflector Model Study," Westinghouse Electric Company.
45. October 2008 - August 2009, "CTF Development and Coupling", Sponsored by South African Nuclear Energy Corporation (NECSA), South Africa.
46. September 2008 – August 2009, "Development of Real-time Extension of RELAP5-3D – Phase II", GSE Power Systems.
47. October 2007 - September 2010, "PARCS/TRACE Development and Assessment for Stability Analysis," Purdue University.
48. September 2007 - August 2009, "Advanced Deterministic Transport Methods for PBMR Analysis – Phase II," PBMR Ltd (Pty).
49. October 2007 – September 2008, "PARCS/TRACE Development and Assessment for Stability Analysis", Purdue University.
50. September 2007 – September 2008, "Development of Real-time Extension of RELAP5-3D – Phase I", GSE Power Systems.
51. September 2007 – December 2008, "DOE GNEP Partnership University Readiness".
52. September 2007 - December 2008, "DOE AFCI Research".
53. August 2007 – October 2007, "Assessment of FRAPCON Capabilities for Prediction of Nuclear Fuel Behavior in Advanced Burners", ANL.
54. March 2006 – August 2008, "NGM Feasibility Study - Phase I," Westinghouse Electric Company.
55. August 2006 - December 2008, "Sensitivity Study on the Energy Group Structure for HTR Analysis - Phase I," INL.
56. September 2006 – December 2008, "Optimization of Coupled Neutronics/Thermal-Hydraulics Methodology for Safety Analysis of PBMR", NNR.
57. October 2006 - May 2007, "Generation of Cross-section Libraries for Coupled RELAP5/PARCS Calculations of VVER-440 Reactors in Armenia," PNNL, DOE.
58. July 2006 - September 2007, "Development of Pilot Professional Summer Program on Reactor Dynamics," DOE INIE Mini-Grant.
59. September 2005 - August 2007, "Advanced Deterministic Transport Methods and Optimal Selection of Spectral Zones for PBMR Analysis – Phase I," PBMR Ltd (Pty).
60. April 2005 - August 2008, "OECD/NRC BFBT Sub-channel Benchmark," NRC.
61. January 2005 - December 2010, "Automated Monte Carlo Based Depletion Methodology," AREVA NP, Germany.
62. May 2005 - May 2006, "PARAGON Code Project," Westinghouse Electric Company.
63. November 2004 - March 2006, "HELIOS Model Refinements and Input Decks for Different Types of IRIS Assemblies," Battelle-ORNL.
64. September 2004 - August 2006, "Improving the Transient Analysis Models of POLCA-T," Westinghouse, Sweden.
65. January 2003 - September 2007, "TRACE/PARCS BWR Assessment," Purdue/NRC.
66. January 2003 - May 2006, "Monte Carlo Modeling of the PSU Beam Port Facility," INIE, DOE.
67. July 2003 - September 2005, "A New Methodology for Early Anomaly Detection of BWR Instabilities," DOE NEER.

68. June 2003 - December 2005, "Accuracy Evaluation of the Peak Pin Exposure Calculations in Current LWR Core Design Codes," FERMI.
69. May 2003 - December 2004, "Consistent Generation of Two-Group Kinetics Data for Coupled 3D Transient Calculations," Westinghouse ABB, Sweden.
70. May 2003 - September 2003, "Analysis TT Transients with S-RELAP5," FANP, Richland.
71. April 2003 - December 2003, "Investigations of water Ingress Reactivity and mixed Moderator Effects in Pebble-Bed Core Designs Using MICROX-2," INEEL, DOE.
72. February 2003 - October 2003, "Develop Nuclear Cross-Section in Support of the NERI IPP," ORNL, DOE.
73. January 2002 - December 2008, "BWR Cycle and Coupled Calculations," CEA, France.
74. June 2002 - August 2005, "Development of Advanced Methods for PBMR Neutronics," DOE NERI.
75. January 2002 - December 2003, "CRISSUE-S Project," DOE.
76. January 2002 – December 2002, "Development of PARCS for Advanced Reactor Modeling", Purdue University.
77. 2002 - 2003, "Minimizing the Gamma Heating on SFP Walls", FERMI.
78. July 2001 - June 2004, "Optimizing the Placement of Burnable Poisons in the PWRs," FERMI.
79. January 2001 - December 2003, "Developing and Maintaining ENTRÉE Simulator Coupled with TRAC," TEPSYS, Japan.
80. 2001 - 2002, "TRAC-M/PARCS Application to BWR Stability Analysis. Calculation of the OECD/NEA BWR Ringhals 1 Benchmark", US NRC.
81. 2001 - 2002, "Scoping Studies for Optimum Fuel Burnup and Cycle Length", DOE/EPRI/Exelon.
82. January 2000 - December 2007, "Development of COBRA-TF for Stand-Alone and Coupled Calculations – Phase I," AREVA NP, Germany.
83. January 2000 - December 2006, "Advanced Fuel Management for PSU TRIGA Reactor," Penn State RSEC.
84. January 2000 - September 2005, "Neutron Physics Analysis Method Assessment for VVER Reactors," Battelle-PNNL/DOE.
85. 2000 - 2002, "Development of VVER Core Loading Optimization System", SKODA Inc.
86. 2000 - 2002, "OECD/NRC BWR TT Benchmark Problem", US NRC.
87. 2000 - 2001, "Core Model – PARCS/RELAP5", BNL.
88. 2000 - 2001, "Transient Cross-Section Methodology", Siemens Nuclear Power.
89. 2000 - 2001, "Improved Analysis of LWR Pin-by-Pin Effects", FERMI.
90. 1999 - 2000, "Validation of Coupled Neutronics/Thermal-Hydraulics Codes Developed at PSU and Siemens Using Experimental Data", Siemens-KWU, Germany.
91. 1999 - 2000, "Coupling the 3-D Kinetics Model ENTRÉE with TRAC Codes and Benchmarking the Coupled Codes", Tepco Software Inc., Japan.
92. 1998 - 1999, "Development and Verification of Advanced Fuel Management Code System for PSU TRIGA Reactor" Penn State RSEC.

93. 1998 - 1999, "Development and Verification of the Hot Channel Model for the Coupled TRAN/NEM Codes", Project FERMI.
94. 1998, "Conduct Research in Boron Dilution Transients", GPU Nuclear.
95. 1997 - 2000, "OECD/NRC PWR MSLB Benchmark Problem", US NRC.
96. 1996 - 1999, "TRAC Users' Group", TRAC Users.
97. 1997 -1998, "Development of an ATHLET Input Deck for the Dodeward Reactor", FZR, Germany.
98. 1996 -1997, "REA and MSLB Analyses for TMI-1 Power Upgrade Using TRAC-PF1/NEM", GPU Nuclear and EPRI.

## **SERVICE TO THE DISCIPLINES AND TO THE PROFESSION**

### 1. Organizing conferences, service on conference committees

Program Committee of the 3rd International OECD/NRC MSLB Benchmark Workshop, Garching by Munich, Germany, Member, Spring 1999 January 1999 - May 1999

Special Session of the International Conference ICONE8 Advanced Coupled Three-Dimensional-Kinetics Thermal-Hydraulics Methodologies, Organizer, November 1999-March 2000 November 1999 - March 2000

Program Committee of the 4th International OECD/NRC MSLB Benchmark Workshop, Paris, France, Member, Spring 2000 January 2000 - March 2000

Program Committee of the PSYSOR-2000 International Conference, Pittsburgh, PA, USA, Member, Spring 2000 January 2000 - May 2000

Program Committee of the 1st International OECD/NRC BWR TT Benchmark Workshop, Philadelphia, PA, USA, Co-Chair, Fall 2000. August 2000 - December 2000

Special Session of the 2001 ANS Annual Meeting and subsequent Special Issue of Nuclear Technology entitled: Numerical and Computational Aspects of the coupled 3-D Core/Plant Simulations: OECD/NRC PWR MSLB Benchmark, Organizer and Editor. September 2000-August 2001. September 2000 - August 2001

ICONE 10 International Conference, Reviewer for Track 7 Thermal-Hydraulics, Fall 2001 September 2001 - November 2001

Program Committee of the 2nd International OECD/NRC BWR TT Benchmark Workshop, PSI Switzerland, Co-Chair, Fall 2001 September 2001 - November 2001

Special Session at PHYSOR 2002 and subsequent Special Issue of Nuclear Technology entitled: Numerical and Computational Aspects of the coupled 3-D Core/Plant Simulations: OECD/NRC BWR TT Benchmark, Organizer and Editor. October 2001- November 2002 October 2001 - November 2002

Program Committee of the PSYSOR-2002 International Conference, Seoul, Korea, Member, 2001-2002 November 2001 - October 2002

PHYSOR 2002 International Conference, Reviewer for Areas Reactor Dynamics and Coupled Neutronics/Thermal-Hydraulics, January-February, 2002 January 2002 - February 2002

ANS Annual Meeting 2002, Reviewer for Reactor Physics Sessions, January-February, 2002 January 2002 - February 2002

Program Committee of the 3rd International OECD/NRC BWR TT Benchmark Workshop, Dresden, Germany, Co-Chair, Spring 2002 January 2002 - May 2002

Program Committee of the 5th International OECD/NRC BWR TT Benchmark Workshop, Barcelona, Spain, Co-Chair, Fall 2002-Spring 2003 September 2002 - February 2003

Program Committee of the 1st International OECD/DOE/CEA V1000CT Benchmark Workshop, Saclay, France, Co-Chair, Spring 2003 January 2003 - May 2003

Technical Program Committee of the ANS ANFM 2003 Conference, Member, Spring-Summer 2003 March 2003 - August 2003

Technical Program Committee of the PHYSOR 2004 Conference, Member, Summer 2003-Spring 2004 August 2003 - April 2004

Special Session "Coupled Neutronics/Thermal-Hydraulics Code Development and Application to Advanced Reactor Designs" at the Annual 2004 ANS Meeting, Organizer and Chair January 2004 - June 2003

Second OECD/DOE/CEA V1000CT Benchmark Workshop, Sofia, Bulgaria, Co-Chair of Organizing and Technical Committee, January 2004 - May 2004

Program Committee of the 3D SUNCOP Seminar, University Park, PA, USA, Co-Chair, Spring 2004 January 2004 - May 2004

Third PBMR-268 Benchmark Workshop, University Park, PA, USA, Co-Chair of Organizing and Technical Committee, Summer 2004 January 2004 - June 2004

Special Session on the OECD/NRC BFBT Benchmark at NUTHOS-6 Conference, Nara, Japan, Organizer and Co-Chair, January 2004 - October 2003

First OECD/NRC BFBT Benchmark Workshop, Nara, Japan, Co-Chair of Organizing and Technical Committee, June 2004 - October 2004

Fourth PBMR-268 Benchmark Workshop, Petten, NRG, Netherlands, Co-Chair of Organizing and Technical Committee, January 2005 - March 2005

Third OECD/DOE/CEA V1000CT Benchmark Workshop, Munich, Germany, Co-Chair of Organizing and Technical Committee, January 2005 - April 2005

First OECD PBMR-400 Benchmark Workshop, Paris, France, Co-Chair of Organizing and Technical Committee, January 2005 - June 2005

Second OECD/NRC BFBT Benchmark Workshop, University Park, PA, USA, Co-Chair of Organizing and Technical Committee, January 2005 - July 2005

M&C 2005 Conference, Member of Technical Committee, Session Chair and Reviewer, January 2005 - October 2005

Workshop on RELAP-3D Capability, (on the results of Ukraine VVER Special Transient Analysis Project) Kyiv, Ukraine 1-5 August 2005, Co-Chair of Organizing and Technical Committee, May 2005 - August 2005

Second OECD PBMR-400 Benchmark Workshop, Paris, France, Co-Chair of Organizing and Technical Committee, October 2005 - February 2006

Fourth OECD/DOE/CEA V1000CT Benchmark Workshop, Co-Chair of Organizing and Technical Committee, Pisa, Italy January 2006 - April 2006

Third OECD/NRC BFBT Benchmark Workshop, Co-Chair of Organizing and Technical Committee, Pisa, Italy January 2006 - April 2006

OECD UAM-2006 Workshop, Co-Chair of Organizing and Technical Committee, Pisa, Italy January 2006 - April 2006

PHYSOR-2006 Conference, Member of Technical Committee, Session Chair and Reviewer, January 2006 - September 2006

ICAAP-2007 Conference, Member of Technical Committee, Session Chair and Reviewer, September 2006 - May 2007

Third OECD PBMR-400 Benchmark Workshop, Paris, France, Co-Chair of Organizing and Technical Committee, September 2006 - February 2007

NURETH-12 Conference, Member of Technical Committee, Session Chair and Reviewer, October 2006 - September 2007

US DOE VVER-440 Reactor Workshop, Chair of the Program and Organizing Committee, January 2007 - April 2007.

Fifth OECD/DOE/CEA V1000CT Benchmark Workshop, Co-Chair of Organizing and Technical Committee, Paris, France January 2007 - May 2007

Fourth OECD PBMR-400 Benchmark Workshop, Paris, France, Co-Chair of Organizing and Technical Committee, September 2007 - January 2008

PHYSOR-2008 Conference, Member of Technical Committee and Track Leader for Track 7 “NPP Transients”, September 2007 - September 2008

Fifth OECD/NRC BFBT Benchmark Workshop, Co-Chair of Organizing and Technical Committee, Garching near Munich, Germany, January 2008 - April 2008

OECD UAM-2 Workshop, Co-Chair of Organizing and Technical Committee, Garching near Munich, Germany, January 2008 - April 2008

Fifth OECD PBMR-400 Benchmark Workshop, Interlaken, Switzerland, Co-Chair, July 2008 - October 2008

OECD UAM-3 Workshop, Co-Chair, State College, PA, USA January 2009 - April 2009

Sixth OECD/NRC BFBT Benchmark Workshop, Co-Chair, University Park, PA, USA January 2009 - April 2009

OECD Kalinin-3 First Workshop, Co-Chair, State College, PA, USA January 2009 - April 2009

M&C 2009 Conference, Session Organizer and Member of the Organizing and Technical Committee, April 2008 to May 2009

NURETH-13 Conference, Member of the Organizing and Technical Committee, September 2008 to September 2009

ANFM-IV Conference, Member of the Organizing and Technical Committee, June 2008 to April 2009

OECD UAM-4 Workshop, Co-Chair, Pisa, Italy, January 2010 - April 2010

OECD Kalinin-3 Second Workshop, Co-Chair, Pisa, Italy January 2010 - April 2010

Technical Co-Chair, PHYSOR-2010 Conference - Advances in Reactor Physics to Power the Nuclear Renaissance, Sheraton Station Square Hotel, Pittsburgh, Pennsylvania, USA, May 9-14, 2010.

Verification and Validation for Nuclear Systems Analysis, DOE/INL Workshop II, Member of the Organizing and Technical Committee, May 24-28, 2010, Beach Cove Resort, North Myrtle Beach, SC, October 2009 - May 2010

Track Leader and Member of Technical Committee of the HTR 2010 International Conference, Prague, Czech Republic, October 18-20, 2010.

OECD Kalinin-3 Third Workshop, Co-Chair, Stockholm, Sweden January 2011 - April 2011

OECD UAM-5 Workshop, Co-Chair, Stockholm, Sweden January 2011 - April 2011

OECD/NRC Oscarshamn-2 BWR Stability Start-up Benchmark Meeting, Co-Chair, Stockholm, Sweden January 2011 - April 2011

Track Leader and Member of Technical Committee of the International Conference on Mathematics and Computational Methods applied to Nuclear Science and Engineering (MC 2011), May 8-12, 2011, Rio de Janeiro, Brazil.

OECD Kalinin-3 Fourth Workshop, Co-Chair, Karlsruhe, Germany, January 2012 - May 2012

OECD UAM-6 Workshop, Chair, Karlsruhe, Germany, January 2012 - May 2012

OECD/NRC Oscarshamn-2 BWR Stability First Benchmark Workshop, Co-Chair, Karlsruhe, Germany, January 2012 - May 2012

Track Leader, Member of Technical Committee, Session Organizer and Chair, and Reviewer of the PHYSOR 2012 conference "Advances in Reactor Physics - Linking Research, Industry, and Education", Knoxville, Tennessee, USA, April 15-20, 2012

Member of Technical Committee of the HTR 2012 International Conference, Tokyo, Japan, October 28 - November 1, 2012.

Member of International Technical Program Committee of the M&C 2013 Conference, Sun Valley Resort in Sun Valley, Idaho, May 5-9, 2013.

Member of Technical Program Committee, Workshop Organizer, and Reviewer of the 15th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-15), Pisa, Italy, May 12-16, 2013.

OECD Kalinin-3 Fifth Workshop, Co-Chair, Paris, France, January 2013 - April 2013

OECD UAM-7 Workshop, Chair, Paris, France, January 2013 - April 2013

OECD/NRC Oscarshamn-2 BWR Stability Second Benchmark Workshop, Co-Chair, Paris, France, January 2013 - April 2013

Member of International Technical Program Committee of the PHYSOR-2014 international conference "The Role of Reactor Physics towards Sustainable Future", 28 September – 4 October, 2014, Kyoto, Japan.

Track Leader of Track # 9 "Transient and Safety Analysis" and Member of Technical Committee, PHYSOR-2014 international conference "The Role of Reactor Physics towards Sustainable Future", 28 September – 4 October 2014, Kyoto, Japan.

OECD UAM-8 Workshop, Chair, Garching, Germany, January 2014 - May 2014

OECD/NRC Oscarshamn-2 BWR Stability Third Benchmark Workshop, Co-Chair, Garching, Germany, January 2014 - May 2014

Intermediate Working Meeting of the Nuclear Science Expert Group on Multi-Physics Experimental Data, Benchmarking and Validation (EGMPEBV), Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Nuclear Science Committee, December 2015, Aix-en-Provence, France, Sponsored by US DOE and NEA/OECD, Presenter

Third Meeting of the Nuclear Science Expert Group on Multi-Physics Experimental Data, Benchmarking and Validation (EGMPEBV), Nuclear Energy Agency/Organization for Economic Cooperation and



Development (NEA/OECD) Nuclear Science Committee, September 2015, Paris, France, Sponsored by US DOE and NEA/OECD, Presenter

Nuclear Energy Knowledge and Validation Center (NEKVaC) Business Meeting, Idaho National Laboratory (INL), Idaho Falls, July 2015, Sponsored by US DOE, Attendee

Member of Technical Committee, Advances in Nuclear Fuel Management V (ANFM 2015) Conference Hilton Head Island, South Carolina, USA, March 29 – April 1, 2015

Member of Technical Committee, ANS MC2015 - Joint International Conference on Mathematics and Computation (M&C), Supercomputing in Nuclear Applications (SNA) and the Monte Carlo (MC) Methods, Nashville, Tennessee, April 19–23, 2015

Sixth Meeting of the Nuclear Science Expert Group on Multi-Physics Experimental Data, Benchmarking and Validation (EGMPEBV), Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Nuclear Science Committee, September 2016, Paris, France, Sponsored by US DOE and NEA/OECD, Presenter

Southeastern Universities Nuclear Reactors Institute for Science and Education (SUNRISE) Department Chairs Retreat, July 2016, Charlotte, NC, Attendee

CASL Round Table Discussions, Sandia National Laboratory, Albuquerque, NM, July, 2016, Attendee

Tenth Workshop on Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Uncertainty Analysis in Modeling (UAM-10) Benchmark, Paul Scherrer Institute (PSI), Switzerland, May-June 2016, Sponsored by NEA/OECD, Organizer, Presenter

Third COBRA-TF User's Group Meeting (CTF-3), Paul Scherrer Institute (PSI), Switzerland, May-June 2016, Organizer, Chair, Presenter

Tenth Workshop on Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Uncertainty Analysis in Modeling (UAM-10) Benchmark, Paul Scherrer Institute (PSI), Switzerland, May-June 2016, Sponsored by NEA/OECD, Organizer, Presenter

Fifth Workshop on Organization for Economic Cooperation and Development/US Nuclear Regulatory Commission (OECD/NRC) Oscarshamn-2 BWR Stability Benchmark (O-5), Paul Scherrer Institute (PSI), Switzerland, May-June 2016, Sponsored by NEA/OECD, Organizer, Attendee

First Workshop on Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Time-Dependent Neutron Transport (C5-G7-TD) Benchmark Meeting, Paul Scherrer Institute (PSI), Switzerland, May-June 2016, Sponsored by NEA/OECD, Attendee

Fifth Workshop on Organization for Economic Cooperation and Development/US Nuclear Regulatory Commission (OECD/NRC) Sodium Fast Reactor (SFR) - Uncertainty Analysis in Modelling (UAM) benchmark meeting (SFR-UAM), Paul Scherrer Institute (PSI), Switzerland, May-June 2016, Sponsored by NEA/OECD, Attendee

Third International Atomic Energy Agency (IAEA) Research Coordination Meeting on High Temperature Gas Cooled Reactors (HTGR) Reactor Physics, Thermal-Hydraulics and Depletion Uncertainty Analysis, Idaho National Laboratory (INL), Idaho Falls, May 2016, Presenter

Consortium for Advanced LWR Simulations (CASL) Annual Review of NC State Meeting, North Carolina State University, Raleigh, NC, April 2016, Presenter

CTF Developers Workshop, Consortium for Advanced LWR Simulations, North Carolina State University, Raleigh, NC, January 2016, Organizer, Presenter

American Nuclear Society (ANS) Winter Meeting, Washington DC, October- November 2017, Session Organizer

American Nuclear Society (ANS) 2017 Annual Meeting, San Francisco, CA, June 11-15, 2017, Session Organizer and Chair

Eight Meeting of the Nuclear Science Expert Group on Multi-Physics Experimental Data, Benchmarking and Validation (EGMPEBV), Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Nuclear Science Committee, September 2017, Paris, France, Sponsored by US DOE and NEA/OECD, Presenter

Workshop on Multi-Physics Model Validation, Sponsored by the Nuclear Energy Knowledge and Validation Center (NEKVaC), INL in cooperation with the OECD/NEA Expert Group of Multi-physics Experiments, Benchmarks, and Validation (EGMPEBV), June 27-29, NE-NCSU, Raleigh, NC, Organizer, Chair, Presenter

Fourth International Atomic Energy Agency (IAEA) Research Coordination Meeting on High Temperature Gas Cooled Reactors (HTGR) Reactor Physics, Thermal-Hydraulics and Depletion Uncertainty Analysis, Idaho National Laboratory (INL), Vienna, Austria, May 2017, Presenter

Second Nuclear and INDUSTRIAL Engineering (NINE) S.r.l. Senior Advisory Group (NSAG) Meeting, Skopje, Macedonia, May, 2017, Attendee

Fourth COBRA-TF User's Group Meeting (CTF-4), AREVA GmbH, Erlangen, Germany, May 2017, Organizer, Chair, Presenter

Eleventh Workshop on Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Uncertainty Analysis in Modeling (UAM-11) Benchmark, P AREVA GmbH, Erlangen, Germany, May 2017, Sponsored by NEA/OECD, Organizer, Chair, Presenter

Fifth Meeting of the Nuclear Science Expert Group on Multi-Physics Experimental Data, Benchmarking and Validation (EGMPEBV), Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Nuclear Science Committee, March 2017, Paris, France, Sponsored by US DOE and NEA/OECD, Presenter

8th International Conference on Simulation Methods in Nuclear Science and Engineering (8ICSMNSE), Ottawa, Canada, October 9-11, 2018, Plenary Speaker.

American Nuclear Society (ANS) 2018 Best Estimate Plus Uncertainty (BEPU) International Conference, Lucca, Italy, May 13-18, 2018, Member of Technical Committee.

9<sup>th</sup> Meeting of the Nuclear Science Expert Group on Multi-Physics Experimental Data, Benchmarking and Validation (EGMPEBV), NEA/OECD, Nuclear Science Committee, September 2018, Paris, France, Sponsored by US DOE and NEA/OECD, Presenter

Sixth International Atomic Energy Agency (IAEA) Research Coordination Meeting on High Temperature Gas Cooled Reactors (HTGR) Reactor Physics, Thermal-Hydraulics and Depletion Uncertainty Analysis, Idaho National Laboratory (INL), Vienna, Austria, May 2018, Presenter

Fifth COBRA-TF User's Group Meeting (CTF-5), NINE, Lucca, Italy, May 2018, Organizer, Chair, Presenter

First Workshop on Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Rostov-2 Benchmark, NINE, Lucca, Italy, May 2018, Sponsored by NEA/OECD, Organizer, Chair, Presenter

Kick-off Workshop on Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) CANDU Thermal-Hydraulic Benchmark (CANDU-TH), NINE, Lucca, Italy, May 2018, Sponsored by NEA/OECD, Organizer

Fourth Workshop on Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Sodium Fast Reactor (SFR) Uncertainty Analysis in Modeling (UAM) Benchmark Workshop (SFR-UAM-4), NINE, Lucca, Italy, May 2018, Sponsored by NEA/OECD, Presenter

Twelfth Workshop on Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Uncertainty Analysis in Modeling (UAM-12) Benchmark, NINE, Lucca, Italy, May 2018, Sponsored by NEA/OECD, Organizer, Chair, Presenter

Seventh Meeting of the Nuclear Science Expert Group on Multi-Physics Experimental Data, Benchmarking and Validation (EGMPEBV), Nuclear Energy Agency/Organization for Economic Cooperation and Development (NEA/OECD) Nuclear Science Committee, February 2018, Paris, France, Sponsored by US DOE and NEA/OECD, Presenter

4<sup>th</sup> Fourth OECD/NEA Time-Dependent Neutron Transport (C5G7-TD) benchmark meeting (C5G7-TD-4), ORNL, Oak Ridge, USA, May 2019, Sponsored by NEA/OECD, Participant

13th Workshop on NEA/OECD Uncertainty Analysis in Modeling (UAM-13) Benchmark, ORNL, Oak Ridge, USA, May 2019, Sponsored by NEA/OECD, Organizer, Chair, Presenter

Kick-off meeting on OECD/NEA TVA Watts Bar 1 (WB1) Multi-Cycle Multi-Physics benchmark (TVA WB1), Participant

10th Meeting of the Nuclear Science Expert Group on Multi-Physics Experimental Data, Benchmarking and Validation (EGMPEBV), NEA/OECD, Nuclear Science Committee, February 2019, Paris, France, Sponsored by US DOE and NEA/OECD, Presenter

2nd NEA/OECD ECD/NEA Multi-Physics Model Validation Workshop, GRS, Garching near Munich, Germany, June 2019, Sponsored by NEA/OECD, Organizer, Chair, Presenter

2nd NEA/OECD Rostov-2 Benchmark, GRS, Garching near Munich, Germany, June 2019, Sponsored by NEA/OECD, Organizer, Chair, Presenter

6th COBRA-TF User's Group Meeting (CTF-6), ORNL, Oak Ridge, USA, May 2019, Organizer, Chair, Presenter

1st Workshop on NEA/OECD PHWR Thermal-Hydraulic Benchmark (PHWR-TH-1), ORNL, Oak Ridge, USA, May 2019, Sponsored by NEA/OECD, Organizer

5th Workshop on NEA/OECD Sodium Fast Reactor (SFR) Uncertainty Analysis in Modeling (UAM) Benchmark Workshop (SFR-UAM-5), ORNL, Oak Ridge, USA, May 2019, Sponsored by NEA/OECD, Participant

1st Benchmark Meeting on OECD/NEA Multi-Physics Pellet Clad Mechanical Interaction Validation Benchmark (MPCMIV-1), ORNL, Oak Ridge, USA, May 2019, Sponsored by NEA/OECD, Organizer, Chair

4th Fourth OECD/NEA Time-Dependent Neutron Transport (C5G7-TD) benchmark meeting (C5G7-TD-4), ORNL, Oak Ridge, USA, May 2019, Sponsored by NEA/OECD, Participant

13th Workshop on NEA/OECD Uncertainty Analysis in Modeling (UAM-13) Benchmark, ORNL, Oak Ridge, USA, May 2019, Sponsored by NEA/OECD, Organizer, Chair, Presenter

2020 Best Estimate Plus Uncertainty (BEPU) International Conference, Sicily, Italy, Postponed to May October 11-17, 2020, General Co-Chair.

2021 International Conferences on Mathematics and Computation (M&C 2021), Raleigh, NC, October 3–7, 2021; Member of Technical Committee.

2022 International Conferences on the Physics of Reactors (PHYSOR-2022), Pittsburgh, PA, May 15-20, 2022; Publication Chair, Member of Technical Committee; Track Leader.

## 2. Participation in professional and learned societies

Reviewer of the DOE NERI and NEUP Proposals - from 2001 up to now

Reviewer for the Nuclear Science and Engineering – from 2002 up to now

Reviewer of Annals of Nuclear Energy – from 2006 up to now

Reviewer of Nuclear Technology – from 2004 up to now

Reviewer of Nuclear Engineering and Design - from 2007 up to now

Reviewer of Progress in Nuclear Energy – from 2008 up to now

Member of the Technical Program Committee, Reactor Physics Division, American Nuclear Society, 2000-2003

Member of the Executive Committee, Reactor Physics Division, American Nuclear Society, 2007 - 2010

Editor of Special Issue of Nuclear Technology Journal on OECD/NRC PWR MSLB Benchmark, 2002 - 2003

Editor of Special Issue of Nuclear Science and Engineering Journal on OECD/NRC BWR TT Benchmark, 2004

Editor of Special Issue of Progress of Nuclear Energy Journal on OECD/DOE/CEA V1000CT Benchmark May 2005 - April 2006

Editor of Special Issue of Nuclear Engineering and Design Journal on OECD/NRC BFBT Benchmark September 2007 – May 2011

Editor of Special Issue of Science and Technology of Nuclear Installations Journal on Phase I of the OECD LWR UAM Benchmark – March 2012- December 2012.

Editor of Special Issue of Annals of Nuclear Energy on LWR Multi-physics, August 2013 – December 2014.

Reviewer of the FY 2016 Consolidated Innovative Nuclear Research: Call for Full R&D Applications

Reviewer of the FY 2016 Technology Commercialization Fund (TCF) Call for Proposals

Reviewer of the FY 2016 Small Business Innovation Research (SBIR) Call for Proposals

Reviewer of the Natural Sciences and Engineering Research Council of Canada (NSERC), Collaborative Research and Development (CRD) Grants (2017)

Reviewer of the FY 2017 DOE Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) Program

Reviewer of the FY 2017 Consolidated Innovative Nuclear Research: Call for Full R&D Applications

Reviewer of the FY 2018 DOE Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) Program

Reviewer of the FY 2018 Consolidated Innovative Nuclear Research: Call for Full R&D Applications

FY 2019 DOE Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) Program

Reviewer of the FY 2019 DOE Consolidated Innovative Nuclear Research (CINR) Program

Reviewer of the FY 2020 DOE Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) Program

Reviewer of the FY 2020 DOE Consolidated Innovative Nuclear Research (CINR) Program

Reviewer of the FY 2021 DOE Consolidated Innovative Nuclear Research (CINR) Program

Reviewer of the FY 2022 DOE Consolidated Innovative Nuclear Research (CINR) Program

### 3. Promotion & Tenure External Peer Review Assignments

Dr. Tomasz Kozlowski

Dr. Analisa Manera

Dr. Yunlin Xu

Dr. Pavel Tzvetkov

### **OTHER CONTRIBUTIONS**

Committee Assignments:

**University Committee:**

N/A

**College Committee:**

COE Executive Committee – Member, August 2015 - present

**Departmental Committee:**

N/A

**Others:**

**Head of Department of Nuclear Engineering – August 2015 – present:**

1. Organized and conducted regular faculty, staff, and student meetings.
2. Presented the NE Department at COE and University Meetings and Events.
3. Presented the NE Department at NEDHO meetings and NEDHO Executive Committee meetings.
4. Visited national labs and industrial companies to strengthen cooperation activities.
5. Organized and conducted two Faculty retreats in January 2016 and in January 2019 – prioritized the hiring areas and developed strategy for the PhD program and facilities/space management. Currently have organized next Faculty Retreat Meeting in December 2022 – focus on sustained growth and new strategic vision and plan.
6. Organized and presented at the NC State Energy Council Meetings at in 2016 and 2019.
7. Attended and presented at the alumni meetings.
8. Re-organized and re-assigned Departmental Committees to update and make more efficient their activities.
9. Improved graduate student recruiting with emphasis on PhD students and distance education students. The total number of graduate students has been increased from 95 to 151.
10. Re-organized and expanded NEDAC (Advisory Board) and organized and conducted the yearly NEDAC meeting.

11. Added new JFAs with national laboratories.
12. Worked on awarding endowed and distinguished professorships to the departmental faculty.
13. Led the NE Department Awards committee in nominating faculty and staff to COE, University and off-campus awards:
14. Played a leadership role in changing the NE PhD Qualification Exam.
15. Worked on increasing national and international visibility of NE Department. The NE Graduate program is currently ranked 3<sup>rd</sup> for 4 consecutive years according to the US News Report.
16. Led international activities on MOUs with NNR, South Africa; China and UAE as well as establishing the Nuclear Power Consortia.
17. Worked on establishing CNEFS as a joint center of Departments of Civil and Nuclear engineering.
18. Organized hiring process of 12 new tenure-tenure/track faculty increasing the number of tenure-tenure/track faculty from 15 to 26.
19. Supported the nomination process of undergraduate and graduate students for fellowships and assistantships.
20. Supported faculty and departmental research and education proposal applications with DOE, US NRC and other agencies and industry, national labs, and other sponsors.
21. Worked on bringing industry and laboratory sponsors to senior design project.
22. Improved/modernized student spaces and teaching labs – thermal-hydraulic teaching lab has been completely upgraded, new nuclear computational lab with Generic PWR Simulator has been established, and the library has been upgraded as student space and one of the conference rooms has been modernized.
23. Performed faculty and staff annual performance reviews.
24. Initiated staff hires, promotions, re-classifications, and salary increases.
25. Improved interactions with South Carolina State University (conducted a joint meeting) and students' organizations at the Department.
26. Working on improving the relationships with alumni and departmental website, flyers, presentation, etc.
27. Successfully completed two ABET visits (2026 and 2022), and one Graduate Program Review (2016).
28. Led successful 11 tenure/promotion procedures, 5 re-appointment procedures, and 7 post-tenure reviews.
29. Led the following initiatives and developments:
  - i. Streamlining and growing a diverse NE PhD Program
  - ii. Increasing research expenditures and supporting new research areas
  - iii. Strategic faculty and staff hiring, development, retention and support
  - iv. Improving faculty, staff and student diversifications and promoting a culture of equitability, mutual respect and morale

- v. Increasing external visibility of the Department – nationally and internationally
- vi. Improving cooperation with industry, national labs, governmental and international agencies, and academia
- vii. Expanding and improving the NE undergraduate, graduate and distance education programs:
  - 1. The Undergraduate Program progresses successfully through two ABET accreditation review and is being further enhanced by introducing new classes and minors as well as improving senior design projects in cooperation with industry and national labs
  - 2. The Graduate Program also proceeded successfully through review and is being expanded by introducing new classes, concentrations and certificates with focus on growing of PhD and Distance Education programs.
- viii. Improving the relationship with alumni as well as the development and outreaching activities
- ix. Improving workflow (efficiency and digitalization) and atmosphere (cooperation and collegiality) in the departmental administration
- x. Enhancing quality and capabilities of our space and facilities
- xi. The Reactor Program has achieved all time high metrics and contributes in all Nuclear Engineering Department efforts
- xii. Strong and successful cooperation with industry, national labs and government agencies as well as extensive international activities
- xiii. New areas of research and education are being introduced to respond to changing environment, needs and emerging tendencies and developments
- xiv. Department is growing, diversifying, and is upgrading/successfully modernizing its space and facilities.

**Summary of the state of the Nuclear Engineering Department:**

1. The Department has been very successful in growth and raising external recognition.
2. High relevance of our capabilities to national agenda.
3. Credibility in industry, national labs and government agencies as well as strong international connections.
4. Preeminent innovative education programs.
5. Focus on the growth combined with quality and diversity.
6. Top class experimental and computation facilities and capabilities.
7. Recognized cutting edge interdisciplinary research addressing the Grand Challenges of nuclear science and engineering.
8. Outstanding local and global engagement.