Advancing Multi-Physics Modeling and Simulation for Nuclear Power Applications

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Wednesday, April 5

4:00 pm

Hill Hall 202

Abstract. The presentation will give an overview of the North Carolina State University (NCSU) activities on the development, verification and validation, and uncertainty quantification of multi-physics methodologies for design and safety analysis of nuclear power plants. It will discuss recent enhancements in deterministic and stochastic methods, advances in multi-scale and multi-physics modeling, and associated validation and uncertainty quantification. Examples of application of the developed high-to-low model information methods to single- and multi-physics calculations will be given. Special attention will be devoted to uncertainty propagation in LWR multi-physics and multi-scale simulations for design and safety evaluations.

Biography. Dr. Kostadin Ivanov received a B.S. in nuclear engineering from the Moscow Institute of Power Engineering, Russia. He received his Ph.D. in reactor physics from the Institute of Nuclear Research and Nuclear Energy (INRNE), Bulgarian Academy of Sciences. He was senior research scientist at INRNE and assistant professor at the Technical University of Sofia, Bulgaria. Later, he was a visiting Fulbright scholar at the Nuclear Engineering Department, Pennsylvania State University and visiting scientist at the Research Center Rossendorf Inc., Germany. Prior to joining the NC State faculty, he was a distinguished professor of nuclear engineering and graduate coordinator of nuclear engineering program at the Pennsylvania State University.

Presently he studies the next generation stochastic and deterministic methods in reactor physics analysis and also nuclear cross-section generation and modeling. Ivanov also develops advanced methods for multi-physics coupling for design and safety applications. Another topic is the study of verification and validation methods as well as uncertainty quantification and propagation in modeling and simulations.