PURDUE UNIVERSITY | School of Nuclear Engineering

Nuclear Engineering Seminar

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Whole Core Multiphysics Simulations Enabled through Pin Resolved Transport

Abstract

The VERA core simulator is being developed as a crucial factor for achieving the goals of the Consortium for the Advanced Simulation of Light Water Reactors (CASL). VERA accurately predicts the detailed power, temperature, and isotopic distribution in reactors throughout the reactor fuel's lifetime. This information serves as the basis for understanding CASL's challenge problems, including crud-induced power shift (CIPS) and crud-induced localized corrosion (CILC). An overview of the VERA simulation suite is presented herein, along with simulations of Watts Bar Nuclear Power Station operations, analysis of the methods' accuracy, and demonstration VERA's ability to predict CIPS.

Dr. Benjamin S. Collins is a senior staff scientist in the Reactor Physics group at Oak Ridge National Laboratory (ORNL). He received his B.S and M.S. degrees in Nuclear Engineering from Purdue University in 2007 and 2008 respectively. He received his Ph.D. from the University of Michigan in Nuclear Engineering, Radiological Science, and Scientific Computing in 2011. After completing one year of postdoctoral study at the University of Michigan, he joined the faculty as a Research Scientist for two years before joining ORNL in 2014. Since coming to ORNL, Ben received the CASL Knight Award for technical contributions to CASL, including his work on Crud Induced Power Shift simulations of the Watts Bar Nuclear Power Station and the American Nuclear Society Early Career Reactor Physicist award for his contributions to Crud Induced Power Shift and Molten Salt Reactor modeling and simulation efforts. Ben also remains an Adjunct Assistant Professor at the University of Michigan where he continues to advise students' doctoral research.