NUCLEAR ENERGY RESEARCH INITIATIVE

Advanced Instrumentation and Control Methods for Small and Medium Export Reactors with IRIS Demonstration

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Project Number: 08-058

Program Area: Advanced Fuel Cycle R&D

Collaborators:
North Carolina State University
Pennsylvania State University
South Carolina State University
Westinghouse

Project Description

This research project will investigate, develop, and validate advanced methods for sensing, controlling, monitoring, and diagnosing small- and medium-sized export reactors (SMR) and apply these techniques to the International Reactor Innovative & Secure (IRIS). The research focuses on three topical areas with the following objectives:

- To develop and apply simulation capabilities and sensitivity/uncertainty analysis methodologies to address sensor deployment analysis
- To develop and test an autonomous/hierarchical control architecture and apply to the IRIS design
- To develop and test an integrated monitoring, diagnostic, and prognostic system for SMRs using the IRIS design as a test platform

The research tasks are focused on meeting the unique needs of reactors that may be deployed in developing countries with limited support infrastructure. These applications will require smaller, robust reactor designs with advanced technologies for sensors, instrumentation, and control. The methodologies developed can also be used for sensor deployment analysis, autonomous control, and monitoring/diagnosis/prognosis in other types of nuclear plant or hydrogen facilities, in addition to addressing two of the eight needs outlined in the recently published "Technology Roadmap on Instrumentation, Control, and Human-Machine Interface (ICHMI) to Support DOE Advanced Nuclear Energy Programs."