



NUC E 590 SEMINAR

Nuclear Engineering

Thursday, February 21, 2008

Seminar at 4:00 p.m.—135 Reber

(Reception at 3:30 p.m.—hallway outside of 121 Reber)

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Advanced Nuclear Reactors: Status and Summary of the Nuclear Regulatory Commission's Thermal-Hydraulic Research Related to Advanced Reactor Design Certification

The Nuclear Regulatory Commission (NRC) is currently in the process of reviewing several advanced nuclear reactor designs. These designs include the AP1000, APWR and EPR pressurized light water reactors, the ESBWR boiling water reactor, the MHTGR and PBMR gas reactors, and IRIS, which is a pressurized water reactor that allows boiling within heat exchangers that surround the core. Each of these designs offer significant improvements in safety by taking advantage of the prior testing, analysis, and operational experience gained from existing plants. The unique features of these new designs however, present significant challenges to thermal-hydraulic safety analysis. For the most part, existing thermal-hydraulic codes have been developed to analyze specific accident scenarios hypothesized in conventional light water reactors.

To provide an independent analysis capability to assist the NRC in conducting its reviews, the Office of Nuclear Regulatory Research is improving its thermal-hydraulic codes by adding additional features and capabilities to model processes unique to these advanced reactors. Experimental data needs are being identified and addressed. This paper describes the efforts currently underway and presents some of the initial results. The AP1000, which recently completed Design Certification, is used as an example to highlight the research performed by the NRC.