| NEER FY 2001<br>PROJECT ABSTRACT | |
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| **Grant Number:** | 01ID14120 |
| **Project Title:** | Nuclear-Coupled Thermal-Hydraulic Instabilities and their Effects on Dryout |
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| **Abstract:** | The proposed study focuses on the experimental and analytical investigation of thermal-hydraulic instabilities, nuclear-coupled thermal-hydraulic instabilities and their effects on dryout in a natural circulation BWR system. This is a particularly important topic for reactors cooled by two-phase natural circulation under normal and accident conditions typical of advanced LWR with passive safety systems. The major objectives of this study are to develop a relevant database and then to develop a good physical understanding of above thermal-hydraulic instabilities. The first topic of this project is to study thermal-hydraulic instabilities during startup, such as density wave oscillation and flashing instability. The second topic is to study the nuclear-coupled thermal-hydraulic instabilities that might occur in a natural circulation BWR system. The third topic is to study the effects of the thermal-hydraulic instabilities on dryout under low pressure and low flow natural circulation conditions.<br><br>In the proposed project, the thermal-hydraulic instabilities and nuclear-coupled thermal-hydraulic instabilities will be experimentally simulated in a scaled experimental facility. State of the art twophase flow instrumentation will be applied, and flow visualization will be performed with a highspeed video system. The aforementioned instabilities and their dynamic effects on dryout will be studied analytically using the drift flux model. Reliable mechanistic models and simple safety design and operational criteria will be developed, and compared with experimental results. This study would provide valuable results to the natural circulation BWR design. |