

In the design of novel nuclear reactors active systems are replaced by passive ones in order to reduce the risk of failure. For that reason natural circulation is being considered as the primary cooling mechanism in next generation nuclear reactor designs such as the natural circulation boiling water reactor (BWR). In such a reactor, however, the flow is not a controlled parameter but is dependent on the power. As a result, the dynamical behaviour significantly differs from that in conventional forced circulation BWRs. For that reason, predicting the stability characteristics of these reactors has to be carefully studied. In this work, a number of open issues are investigated regarding the stability of natural circulation BWRs (e.g. margins to instabilities at rated conditions, interaction between the thermal hydraulics and the neutronics, and the occurrence of flashing induced instabilities) with a strong emphasis on experimental evidence. The prototypical Economical Simplified BWR (ESBWR) design from the General Electric Company was thereby taken as the reference natural circulation BWR. Two experimental facilities located at the Delft University of Technology were used for that purpose: the GENESIS facility which uses Freon as working fluid and the water based CIRCUS facility. IOS Press is an international science, technical and medical publisher of high-quality books for academics, scientists, and professionals in all fields. Some of the areas we publish in: -Biomedicine -Oncology -Artificial intelligence -Databases and information systems -Maritime engineering -Nanotechnology -Geoengineering -All aspects of physics -E-governance -E-commerce -The knowledge economy -Urban studies -Arms control -Understanding and responding to terrorism -Medical informatics -Computer Sciences

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