

Oscillatory Power Instabilities in Boiling Water Reactors

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Nuclear power currently accounts for 15% of the electricity generation worldwide. There are currently approximately 450 nuclear power reactors in operation in over 30 countries around the world, with a total output of approximately 350,000 MW. About 70 of these reactors are boiling water reactors (BWRs), in which water boils inside the reactor core and the steam is directly used to drive a turbine generator to create electricity.

BWRs are found to behave as linear systems under normal operating conditions. However, several stability tests have shown that under certain conditions, BWRs are susceptible to instabilities in which limit-cycles and divergent power oscillations are observed.

Due to the high complexity of the systems involved, most simplified models to date have treated spatial aspects of BWRs instabilities naively. In this presentation I will present a new spatially explicit model which captures these aspects.