



PAUL SCHERRER INSTITUT

LRS SEMINAR

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Achievements in Stability Analysis of Boiling Water Reactors

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One of the challenging areas of reactor dynamics is the stability analysis of Boiling Water Reactors (BWRs), which are complex systems designed to remain very stable under normal operating conditions, but they might be susceptible to instabilities, under very rare and specific conditions, in which diverging power oscillations or even limit cycle oscillations may develop. In this presentation, we explain the problem of instabilities in BWRs along with the motivations behind performing such analysis within STARS project. In addition, an overview of advanced mathematical theories, employed in the analysis, such as nonlinear dynamics and bifurcation theory is provided along with their role in understanding and explaining the observed complex instabilities. Furthermore, we describe the recently developed and validated stability analysis methodology, relying on best-estimate coupled thermalhydraulic/3-D neutron kinetics code system. Finally, we present some results illustrating the capability of the current methodology to simulate stability events/tests, including even very complex patterns, e.g. out-of-phase power oscillations with rotational symmetry line.

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Note: Access to the seminar room is publicly open.