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Autore	Marcel Christian Pablo
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Nota di contenuto	Title Page; Table of Contents; Summary; Samenvatting; Chapter 1. Introduction; Introduction; Natural circulation BWRs basic principle; Classification of BWR instabilities; High Pressure vs. Low Pressure stability; Coupled Neutronics-Thermal-hydraulics; Motivation behind the present work; Outline of this thesis; References; Chapter 2. Downscaling the thermal-hydraulics of natural circulation BWRs: The GENESIS facility; Introduction; Design philosophy-The scaling; Defining the operational conditions; Geometrical scaling; Scaling of the dynamics; Treatment of the distortions Scaling sensitivity to the operational pressureApplication of the proposed scaling design approach; Conclusions; References; Chapter 3. Experimental investigations on the stability of natural circulation BWRs; Introduction; The VRF system; The VRF system design; The VRF system implementation; Stability performance of natural circulation BWRs; Experiments on thermal-hydraulic stability; Experiments on reactor-kinetic stability; The ATHLET numerial results; Conclusions; References; Chapter 4. An experimental parametric study of natural circulation BWRs stability; Introduction GENESIS improvementsParametric study; Effect of the improved VRF

system; Effect of the modeling of the ESBWR fuel rods; Effect of changing the rod diameter; Effect of using a MOX fuel; Effect of the pressure; Effect of the feedwater sparger position; Effect of the void reactivity feedback coefficient; Conclusions; References; Chapter 5. Experimental and analytical investigations on flashing-induced instabilities in a single channel; Introduction; The CIRCUS facility in the single chimney configuration; Experimental results; The stability maps; Dynamical characterization of the instabilities
From single-phase to stable two-phase flowHigh subcooling stable flow circulation; Intermittent oscillations; Sinusoidal oscillations; Low subcooling stable flow circulation; Analysis of the dynamics of the flashing front; Analysis of the inertia of the loop; A lumped parameter model; Experimental results vs. numerical results; A numerical parametric study; Conclusions; References; Chapter 6. Flashing-induced oscillations in parallel channels; Introduction; Description of the CIRCUS facility with two chimneys; Experimental results; The stability behavior
Phenomenological description-From region I to IVRegion I-High subcooling stable flow circulation; Region II-Unstable in-phase flow circulation; Region III-Unstable a-periodical oscillations; Region IV-Unstable out-of-phase oscillations; Analysis of the instability mechanism; Single channel stability vs. two-parallel channels stability; Non-linear analysis of the oscillations; Experimental evidence of bifurcations; Investigations on the nature of the a-periodical oscillations; Conclusions; References; Chapter 7. Conclusions and recommendations; APPENDICES
APPENDIX A: The GENESIS facility technical details

Sommario/riassunto

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

2.

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