

## Annual progress report 2014

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### Bayesian Uncertainty Quantification of Physical Models in Thermal-Hydraulics System Code

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## 1. Objectives of research

The objective of the present research is to quantify the uncertainty of physical model parameters implemented in a thermal-hydraulics system code. The physical models concerned are parameterized either by a physical or tuning parameters. Conforming with the practice of statistical uncertainty propagation widely adopted in the field of nuclear engineering, probability theory is used to quantify the uncertainties related to these parameters with a final form of density function and/or its approximation. The derivation of this density will follow a bayesian approach utilizing probabilistic modeling complemented with the available relevant experimental data.

## 2. Work achieved in the past year (state of research)

## 3. Current state of work

The current state of research along with the achievements during the year are summarized in the table below.

Phase	Task Description	Planned Outcome	Current State
Phase 1	Comprehensive reviews of post-CHF flow regimes models in TRACE and externalization	1 Technical Report (PSI)	• Relevant parameters externalized • PSI contribution to OECD/NEA PREMIUM benchmark finalized
Phase 2	Global sensitivity analysis of (perceived) important parameters	1 Technical Report (PSI)	• Relevant parameters externalized • PSI contribution to OECD/NEA PREMIUM benchmark finalized
Phase 3	Calibration of TRACE re-flood model based on FEBA test facility	1 Technical Report (PSI)	• Relevant parameters externalized • PSI contribution to OECD/NEA PREMIUM benchmark finalized
Phase 4	Calibration of TRACE re-flood model based on another test facility (To be Decided)	1 Conference Paper	• Relevant parameters externalized • PSI contribution to OECD/NEA PREMIUM benchmark finalized
Phase 5	Consolidation of the calibration results based on 2 facilities and validation based on another reflow test facility	1 Journal Article	• Relevant parameters externalized • PSI contribution to OECD/NEA PREMIUM benchmark finalized
Phase 6	Thesis write-up	Thesis	—

#### **4. Calendar of upcoming work**