

Master thesis project on real-time analysis of nuclear accidents

Verification and Validation of Bayesian Belief Network models using deterministic simulations of severe accidents

Vysus Group is seeking a candidate with good analytical abilities, who is interested in logic systems, nuclear engineering, and foresees a future within technical risk management. This Master thesis project aims at developing a consistent verification and validation (V&V) process whilst capturing expertise into a Bayesian Belief Network model.

Project description

RASTEP (RApid Source TErm Prediction) is a software tool developed by Vysus Group to provide decision support in nuclear emergency situations. This is done by letting the user freely answer questions on plant status, with conclusions drawn by an underlying Bayesian Belief Network model based on data from probabilistic safety analysis and presenting radioactive release data from the most likely pre-calculated scenario simulation.

The proposed Master thesis project aims at developing a consistent approach for verification and validation (V&V) of Bayesian Belief Networks for RASTEP.

Background

Development of tools for use in fast, online accident diagnosis at nuclear power plants is increasingly desired by off-site emergency planning and response personnel. RASTEP (RApid Source TErm Prediction) is a computerized tool for realtime prediction of source terms (amounts and timings of radioactive releases).

The tool consists of two modules, each with a specific aim:

- A Bayesian Belief Network (BBN) to predict plant states and the probability of different scenarios
- A source term module that characterizes the amount, chemical composition, release height, and timing of the predicted radioactive release.

RASTEP is adopted by the Swedish Radiation Safety Authority (SSM) and The Norwegian Radiation and Nuclear Safety Authority (DSA). Several other organizations within the field of nuclear safety oversight are also looking at RASTEP as an additional tool to their emergency planning solution.

Vysus Group is a leading engineering and technical consultancy offering specialist asset performance, risk management and project management expertise across complex industrial assets, such as nuclear, rail and road, oil and gas renewables and the energy transition.

