



# MSc thesis proposal

- Title of the research

## Development of a neural network for Critical Heat Flux predictions

(duration: around 6 months)

- Context of the research

The Critical Heat Flux (CHF) is a physical phenomenon that may cause the deterioration of the heat transfer in the core of nuclear reactors, potentially leading to core damage. Its accurate prediction is therefore a crucial issue in nuclear reactor safety.

- Objectives of the research

The proposed thesis concerns the development of a neural network to predict the occurrence of the CHF. It will be realized in preparation of an international OECD/NEA project on the development and application of Artificial Intelligence methodologies for nuclear engineering.

- Work phases

Within this framework, the student will:

- Perform a preliminary literature review on artificial intelligence methodologies.
- Analyze the available experimental CHF database to understand the physical phenomenon and to verify the coherence and exploitability of the experimental data.
- Develop a neural network to predict as accurately as possible the CHF. Different approaches (e.g. different split in training and validation database, number of neurons) will be tested to determine the optimal solution.
- Compare the performance of the newly developed neural networks against the existing models and identify the advantage/disadvantages associated to the usage of artificial intelligence.

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