

**Universität Stuttgart**

Institute für Kernenergetik und Energiesysteme

**Master's  
Thesis**

**Generation and  
Analysis of 2D and  
3D Late-Stage  
Accident Debris Bed  
Cooling Simulations  
for Correlation and  
Comparison Analysis**

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Lehrstuhl für Kerntechnik und Reaktorsicherheit

## **Master's Thesis Proposal:**

### **Generation and Analysis of 2D and 3D Late-Stage Accident Debris Bed Cooling Simulations for Correlation and Comparison Analysis**

#### **Description:**

The Institute of Nuclear Energy and Energy Systems (IKE) researches nuclear reactor safety as part of the InnoPhase project, which applies advanced simulation methods to reactor accident scenarios. In severe accidents, debris beds form with complex geometries, making accurate coolability modeling essential.

IKE's COCOMO (Corium Coolability Model) code simulates thermal-hydraulic processes in these late accident phases. While 3D simulations capture realistic details, they are computationally intensive. 2D simulations are faster but may miss key asymmetries.

This thesis will compare 2D and 3D simulations to evaluate if 2D models are conservative and representative. The goal is to derive correction coefficients or correlations to adjust 2D results for practical use in safety analysis.

#### **Objectives:**

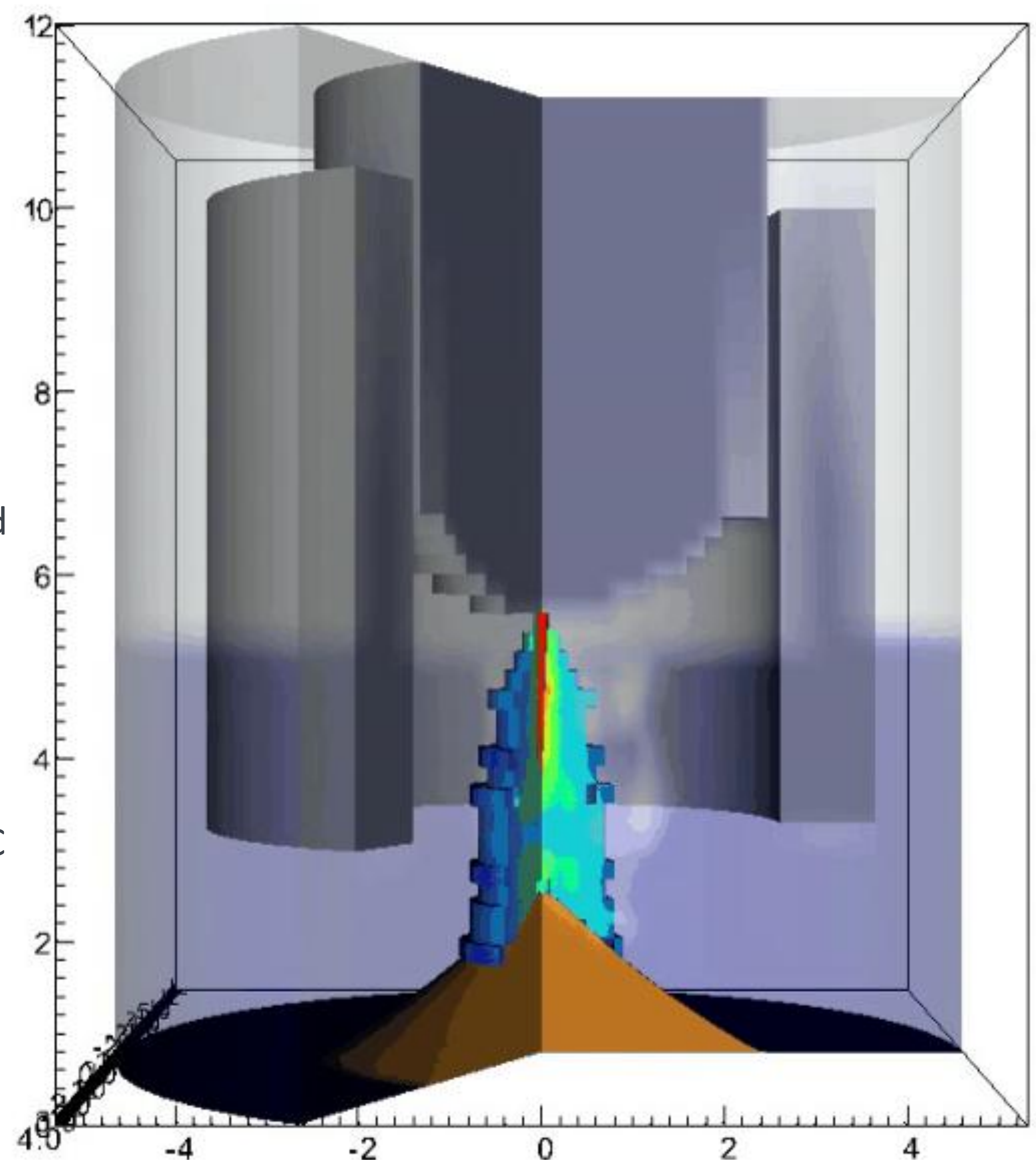
- Learn and use the COCOMO code.
- Run 2D and 3D simulations on HPC clusters.
- Analyze and compare results.
- Derive correction factors or correlations.
- Assess 2D model conservatism for asymmetric scenarios.

#### **Requirements:**

- Thesis can be written in English or German; good proficiency in at least one of these languages is required
- Experience in one of the following coding languages: Python, Matlab, Fortran
- Knowledge in at least one of the following areas: statistics, thermal-hydraulics, Linux systems, HPC environments, nuclear engineering
- High Motivation and reliability
- Willingness to learn new topics and work independently

**Start, Scope of work:** Starting Immediately, 6 month period

**Application documents:** Cover letter, CV, transcript of records



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