

Numerical Analysis of Flash Boiling for Liquid Ammonia Combustion

Topic is suitable for

- ✓ Bachelor thesis
- ✓ Master thesis

Field of activity

Turbulent multiphase flows

Contact Person



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The combustion of ammonia emerges as a promising alternative to carbon-based fuels as it leaves no carbon footprint. Ammonia is typically stored in liquid form, making direct liquid combustion a reasonable approach. However, it's worth noting that ammonia burns poorly as a gas, which makes achieving efficient liquid combustion all the more challenging. One potential solution to tackle this problem is to make use of a phenomenon called flash boiling. Flash boiling occurs when a fluid is superheated beyond its natural boiling point, leading to spontaneous vaporization. As a result, atomization is significantly enhanced, facilitating better mixture formation and ultimately improving combustion efficiency. Understanding the intricacies of flash boiling in ammonia is crucial for optimizing system performance, enhancing safety measures, and advancing sustainable energy technologies.

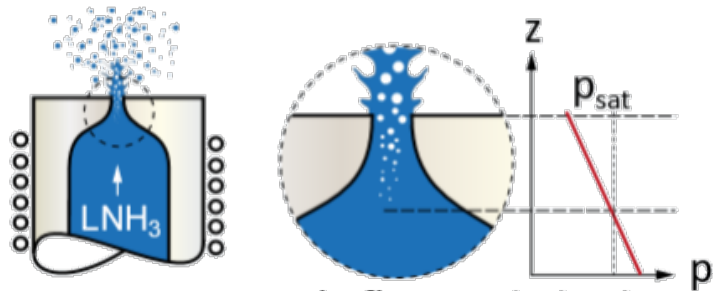


Figure 1. Schematic of the injection process with flash-boiling.

In this study, we will numerically investigate the process of ammonia flashing by developing a physics-based model of the resulting two-phase problem and using it to perform CFD simulations within the frame of an existing spray nozzle.

Your tasks

- ◇ Mathematical formulation of model equations
- ◇ Implementation of the model into a CFD environment
- ◇ Verification and Validation of the model
- ◇ Physical analysis and interpretation of simulation results

About you

This thesis might be suitable for you, if you:

- ◇ Are interested in programming and numerical modeling
- ◇ Have some experience with Linux (desirable)
- ◇ Are self-motivated and are willing to advance your knowledge and skills

If you are interested, contact us for more details.

This thesis does not quite fit your ideas? Feel free to contact us to customize this topic or to find an alternative thesis.