

Towards Greener Inkjet Printing: Cutting-Edge Evaporation Modeling for Energy Reduction



TECHNISCHE
UNIVERSITÄT
DARMSTADT

HIWI/Bachelor/Master's thesis project

Are you passionate about how the tiniest droplets can drive massive technological advancements? This project offers you the chance to work to explore and optimize the physics behind droplet evaporation—a crucial process that can significantly enhance energy efficiency in modern printing technologies.



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Why Inkjet Printing?

Inkjet printing is at the forefront of precision manufacturing, impacting industries from high-quality printing to solar cell production. Yet, one of the major challenges in inkjet printing is the evaporation of ink droplets – a process that accounts for the lion's share of the energy consumption. As energy efficiency becomes increasingly important, particularly in light of the EU's 2030 energy transition goals, finding solutions to reduce this consumption is more critical than ever.

What's the Opportunity?

You will investigate the phenomenon of droplet evaporation through cutting-edge computational methods, directly addressing application needs of our industrial partner Canon Production Printing.

What Will You Do?

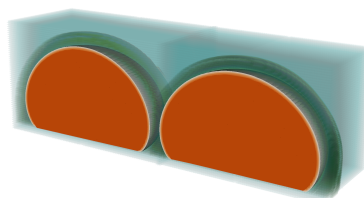
Evaporation is a complex multi-physics phenomenon involving the mixing of fluid components, such as ink and air, phase transformations from liquid to gas, and thermal effects. Conventional methods often fall short in capturing these intricate interactions. In this project, you will employ the phase-field method, which provides a nuanced and accurate representation of droplet behavior during evaporation. This approach enables modeling of complex evaporation processes involving multiple droplets and diverse materials.

What can you expect to learn?

- Multi-physics of evaporation processes
- Advanced computational modeling techniques
- Experience with real-world challenges in collaboration with industry

Are You Up for the Challenge?

Join us by tackling engineering challenges in inkjet printing technology! If you are eager to apply cutting-edge computational techniques and collaborate with industry experts, this project is perfect for you!



Interested? Email me or visit my office!

Note: you will get paid as a HIWI on while working on this project. The project may (but not necessarily) be conducted as a BSc or MSc thesis.

M.F.P. ten Eikelder, D. Schillinger, Journal of Computational Physics 513, 113148, 2024
M.F.P. ten Eikelder, K.G. van der Zee, D. Schillinger, Journal of Fluid Mechanics 990, A8, 2024
M.F.P. ten Eikelder, Journal of Fluid Mechanics 1013, A26, 2025

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