

Effect of water evaporation on multi-component liquids containing particles in printhead nozzle

1. Description

Stable jetting of a multi-component water based ink system from a printhead requires a high level of understanding of the changes in the ink properties in the nozzle. For example, evaporation of water from the nozzle leads to phenomena such as phase-separation and segregation in the nozzle (Figure 1). Unraveling the physics behind these phenomena needs a high level and strong combination of model and experimental based approach.

One of the methods that we are using for above is PAINT. The piezo actuator in the nozzle channel is normally used to generate a jetting pulse. However, this can also be set in the listening mode immediately after a (non) jetting pulse to detect the generated echo. The latter contains valuable information about the actual condition of the ink in the nozzle when the actuation is activated.

The project is part of the joint research program “Fundamental Fluid Dynamics Challenges in Inkjet Printing” between the Physics of Fluids group and Canon Production Printing.

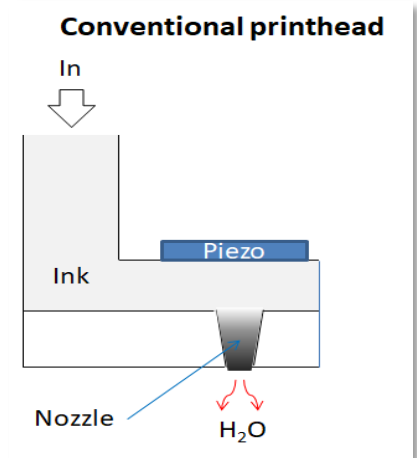


Figure 1: Schematic of the nozzle of a non-recirculation printhead. When the nozzle is not fully active, water evaporates from the nozzle and this leads to e.g. viscosity gradient and phase separation.

2. What you will do and what you will learn?

In the project “Improved Nozzle Stability”, we want to improve our knowledge about the ink behavior in the nozzle by using PAINT models, developed in the joint research program, and PAINT measurement methods for multi-component model liquids that contains particles in it (like real inks). We are looking for enthusiastic students to join us in our mission:

1. You will learn the physics behind the droplet formation and problems involved in evaporation water from the nozzle.
2. You will get hands-on experience on experimental techniques using a printhead in a real jetting system.
3. You will learn about complex liquid behavior especially particle-particle and particle-liquid interactions.
4. You will learn the way of working in real technology and product development projects at Canon Production Printing.

This master project is to be done at Canon in Venlo

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