Abstract Submitted
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Numerical simulations of the full ink-jet printing processes: From jetting to evaporation[1] CHRISTIAN DIDDENS, YAXING LI, TIM SEGERS, University of Twente, HANS REINTEN, YOURI DE LOORE, HERMAN WIJSHOFF, Oc-Technologies B.V., DETLEF LOHSE, University of Twente — Ink-jet printing requires to perfectly control both the jetting of droplets and the subsequent droplet evaporation and absorption dynamics. Considerable complexity arises due to the fact that ink is constituted of a mixture of different liquids, surfactants and pigments. Using a sharp-interface ALE finite element method, we numerically investigate the main aspects of ink-jet printing, both on the jetting side and on the drying side. We show how a short pause in jetting can result in clogged nozzles due to solvent evaporation and discuss approaches how to prevent this undesired phenomenon. Once the droplets have been jetted on paper and is evaporating, the print quality can be deteriorated by the well-known coffee-stain effect, i.e. the preferential deposition of particles near the rim of the droplet. This can be prevented in several ways, e.g. employing controlled Marangoni flow via surfactants or co-solvents or printing on a primer layer jetted in beforehand, thus creating a homogeneous deposition pattern for a perfect final printout.

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