The instability of inkjet printed rivulets

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Inkjet printing has, in the last ten years, become a method of choice for a variety of printing applications. One newly developed technology takes advantage of a thermal Marangoni induced flow to drive a Rayleigh-Plateau instability in a continuous inkjet format. In this situation, the instability is tuned to the benefit of the process. However, as the drops land on the surface a rivulet is formed. This rivulet can also be unstable but can now lead to an objectionable artefact known as coalescence.

In this paper we show the utility of the controlled Rayleigh-Plateau instability in continuous inkjet and contrast it with data and models that provide a description of rivulet generation and stability on porous surfaces. These latter data and models suggest a highly dynamic process that is ultimately controlled by the wetting behaviour of the ink-receiver combination at short timescales. Although the stability criteria reduce to a combination of ideas described originally by Davis and later by Schiaffino & Sonnin together with those presented by Duineveld, their descriptions only encompass two limiting cases and so ignore the more general case of partial wetting hysteresis seen in all practical systems.