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Self Templating Assembly of Drop Lattices LINGZHI CAI, Princeton University, JOEL MARTHELOT, Aix Marseille University, PT BRUN, Princeton University — We study the recursive Rayleigh-Plateau instability of neighboring viscous threads. We have recently found that the successive breakup of viscous threads deposited in an immiscible bath from a moving nozzle generates periodic drop patterns. In addition to the low-energy hexagonal lattice we report a variety of other non-hexagonal lattices obtained by adjusting nozzle translation speed and exploring diverse extrusion toolpaths, e.g. spirals. In order to elucidate this self-assembly mechanism, we study the instability of a single thread close to a periodic template. We find that the presence of a boundary drives the dynamics of the instability and affects the breakup pattern in a certain regime of parameters we will specify. We quantify the "memory" of the system, predicting when the patterns bear an imprint of the initial conditions or instead evolve towards universal solutions. We leverage this understanding to engineer the lattice morphology and characteristics.

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