

Abstract Submitted  
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**Effect of viscoelasticity on the stability characteristics of a drying polymer solution**<sup>1</sup> GEORGE KARAPETSAS, ATHANASIOS VADARLIS, Aristotle University of Thessaloniki — We investigate the stability of an evaporating liquid film which consists of a polymeric solution with a volatile solvent. Besides solutocapillary and thermal Marangoni effects, an important factor affecting the flow, which is often neglected in the literature, is the viscoelastic character of the polymeric solutions typically encountered in practical applications. During the drying process, the concentration of the solvent continuously decreases thus rendering the non-Newtonian character of the solution increasingly important. Here, we develop a model fully accounting for the viscoelastic behaviour and dynamically varying rheological properties of the liquid film. We use a finite element formulation to solve the time-dependent problem and perform a linear stability analysis employing the quasi-steady state approximation, in the limit of slow evaporation. Our numerical results indicate that the increasingly important effect of viscoelasticity destabilizes the flow and also leads to patterns with smaller wavelengths. We discuss the mechanisms which give rise to these instabilities.

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