Abstract Submitted for the DFD19 Meeting of The American Physical Society

Two-dimensional direct numerical simulations of viscoelastic jets<sup>1</sup> KONSTANTINOS ZINELIS, THOMAS ABADIE, RICARDO CONSTANTE-AMORES, OMAR MATAR, Imperial College London — The numerical simulation of spray formation in a non-Newtonian fluid offers substantial challenges and is central to numerous industrial applications such as spray-drying. The aim of the present work is to set the basis for the numerical examination of non-Newtonian atomisation and spray systems. To achieve this, a Direct Numerical Simulations (DNS) approach is followed where all the temporal and spatial scales are resolved completely. We begin with the simulation of two-dimensional numerical simulations of an Oldroyd-B impulsive jet as well as a jet with a constant release velocity into a stagnant gaseous phase using the volume-of-fluid technique to capture the interface and the log-conformation transformation for the solution of the viscoelastic constitutive equation. This permits the exploration of parameter space, capturing the effect of the elastic, viscous, and inertial forces on the ejected droplet size. These simulations serve as a departure point for further work involving three-dimensional simulations of atomisation processes of viscoelastic jets.

<sup>1</sup>Engineering and Physical Sciences Research Council, UK, i-case studentship (sponsored by Johnson Matthey) for Konstantinos Zinelis

> Omar Matar Imperial College London

Date submitted: 29 Jul 2019

Electronic form version 1.4