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Filament break up, drop size and non- Newtonian borate esters in jet flows SURESH AHUJA, Xerox Corporation — Study and analysis of jet flows has found application in such industrial applications as spray coating and inkjet printers. Length-scales and timescales in controlling the dynamics of the thinning and break-up process is found to depend on gravitational forces, surface forces, and mechanical forces shear and extensional forces acting on a fluid. If the gravitational effects are not important, midpoint radius of the viscous filament for Newtonian fluids has been analyzed to depend on the ratio of surface tension to viscosity of the fluid and the process time. The ratio of time to breakup for the visco-capillary and inertio-capillary processes is related to a dimensionless number known as the Ohnesorge *number* In non-Newtonian and visco-elastic fluids, filament radius is dependent on the ration of relaxation modulus to surface tension and exponentially decays with the ratio of process time to the fluid (polymer) relaxation time. Analogous to Ohnesorge number, time scale of break up, in non-Newtonian and visco-elastic fluids, time scale of break up is Deborah number, the ratio of relaxation time to process time. Using fluids of glycol, polyethylene oxide and borate esters, torsion strain experiments were used to determine viscosity and visco-elastic parameters (relaxation modulus and relaxation time) and applied to inkjet process.

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