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Breakup Characteristics of Nanocylinders HARINATH REDDY, Purdue University, ANUPAM TIWARI, SAUMYADIP MUKHOPADHYAY, JOHN ABRAHAM, Purdue University — Liquid breakup at the macroscale has been studied extensively for over a hundred years, but breakup at the nanoscale has only recently attracted attention. The focus of the present work is on the breakup of liquid nanocylinders. Nanocylinders are encountered in several engineering applications and biological systems, e.g. printing on micro-circuitry, precision manufacturing, Golgi apparatus. Breakup at the nanoscale is primarily through the Rayleigh capillary mechanism since the Reynolds numbers are low. The specific research question we address is: does the breakup-time of liquid cylinders at the nanolevel follow the classical scaling relationships derived for capillary breakup at the macrolevel. A coarse-grained molecular dynamics approach is employed for the studies. We will show that for changes in cylinder radius, the scaling holds; but, when viscosity and surface tension are varied, the scaling does not hold. Possible reasons, attributed primarily to the origin of the instability that leads to the breakup, are discussed. Comparisons of other outcomes at the two levels will also be presented.

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