

Abstract Submitted  
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**Unsteady jet in designing innovative drug delivery system<sup>1</sup>** CONG WANG, PAUL MAZUR, JULIA COSSE, STEPHANIE RIDER, MORTEZA GHARIB, Caltech — Micro-needle injections, a promising pain-free drug delivery method, is constrained by its limited penetration depth. This deficiency can be overcome by implementing fast unsteady jet that can penetrate sub-dermally. The development of a faster liquid jet would increase the penetration depth and delivery volume of micro-needles. In this preliminary work, the nonlinear transient behavior of an elastic tube balloon in providing fast discharge is analyzed. A physical model that combines the Mooney Rivlin Material model and Young-Lapalce's Law was developed and used to investigate the fast discharging dynamic phenomenon. A proof of concept prototype was constructed to demonstrate the feasibility of a simple thumb-sized delivery system to generate liquid jet with desired speed in the range of 5-10 m/s.

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