May 18th, 11:30 AM - 12:00 PM

Stochastic Model of Clogging in a Microfluidic Cell Sorter

Thomas G. Fai
Harvard University, tfai@seas.harvard.edu

Stochastic Model of Clogging in a Microfluidic Cell Sorter

January 31, 2017

Thomas Fai
School of Engineering and Applied Sciences, Harvard University
29 Oxford St., Cambridge, MA 02138
Email: tfai@seas.harvard.edu

Abstract

Microfluidic devices for sorting cells by deformability show promise for various medical purposes, e.g. detecting sickle cell anemia and circulating tumor cells. One such device is made up of sequential layers of progressively narrower channels, each layer containing identical channels in parallel. This device can sort many cells simultaneously, but cells eventually clog individual channels and change the device properties in an unpredictable manner. I propose a stochastic model for the failure of such microfluidic devices and present preliminary theoretical and computational results. The failure time distribution is investigated analytically in certain limiting cases.

1