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Stochastic Model of Clogging in a Microfluidic Cell Sorter THOMAS FAI, CHRIS RYCROFT, Harvard University — Microfluidic devices for sorting cells by deformability show promise for various medical purposes, e.g. detecting sickle cell anemia and circulating tumor cells. One class of such devices consists of a two-dimensional array of narrow channels, each column containing several identical channels in parallel. Cells are driven through the device by an applied pressure or flow rate. Such devices allows for many cells to be sorted simultaneously, but cells eventually clog individual channels and change the device properties in an unpredictable manner. In this talk, we propose a stochastic model for the failure of such microfluidic devices by clogging and present preliminary theoretical and computational results. The model can be recast as an ODE that exhibits finite time blow-up under certain conditions. The failure time distribution is investigated analytically in certain limiting cases, and more realistic versions of the model are solved by computer simulation.

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