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Modeling cell migration in tapered microchannels KENG-HWEE CHIAM, FONG YEW LEONG, A*STAR Institute of High Performance Computing — Cellular deformation in confined environment has attracted much attention in the past decade, primarily in the hopes that this can lead to efficient tools for cancer diagnostics in time to come. To further our understanding of cell deformability and motility, cells can be made to flow through micro-fluidic channels. These micro-fluidic devices offer the means of quantifying cell motility characteristics in-vitro through velocity measurements and cell morphology observations. In this study, we are interested in computational modelling of cell migration phenomena in micro-fluidic channels. More specifically, the immersed boundary method is implemented to track the moving cellular interface coupled with the fluid background. It is shown that the migration velocity of the cell is dramatically reduced at the inlet of the micro-channel: a phenomenon also observed experimentally. Furthermore, it is shown that the mechanical properties of the nucleus are important factors affecting cell motility and deformation in a constriction. Comparison is made between two different cases of whole cell in micro-channel flow and isolated nucleus in micro-pipette aspiration.

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