

Abstract Submitted
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Designing active cilia sensors YI YANG, ALEXANDER ALEXEEV,
Georgia Institute of Technology — We employ a hybrid lattice Boltzmann / lattice
spring computational model to simulate the three-dimensional hydrodynamic inter-
actions among actuated and sensory elastic cilia tethered to a wall of a microfluidic
channel. These actuated and sensory cilia are arranged a chessboard pattern on the
channel wall. The actuated cilia are driven by a sinusoidal force applied to their free
ends and induce periodic oscillations of a viscous fluid filling the microchannel. The
passive, sensory cilia are used to measure the force arising due to fluid oscillations.
We show that the combination of sensory and actuated cilia allows us to evaluate
distances to solid objects located in a fluid-filled microchannel, thereby yielding a
useful active sensor for microfluidic and biomedical applications.

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