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Using actuated synthetic cilia to enhance microscale heat transport ZACHARY G. MILLS, ALEXANDER ALEXEEV, Georgia Institute of Technology — We used three dimensional computer simulations to examine heat transport in a microchannel that encompasses a periodic array of actuated synthetic cilia. The channel was filled with a viscous fluid and its walls were maintained at different temperatures. Elastic synthetic cilia were attached to the bottom channel wall and were actuated by a periodic external force applied horizontally to their free ends. To model this multi-component system, we employed a thermal lattice Boltzmann model coupled with the lattice spring model. We probed how the beating cilia affect the heat transfer between channel walls, and how the thermal transport coefficient changes depending on the oscillating frequency and the relative distance between actuated filaments. Our findings could be useful for developing new methods for temperature control in microscale devices.

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