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Ciliary fluid transport enhanced by viscoelastic fluid HANLIANG GUO, EVA KANSO, University of Southern California — Motile cilia encounter complex, non-Newtonian fluids as they beat to gain self-propulsion of cells, transport fluids, and mix particles. Recently there have been many studies on swimming in complex fluids, both experimentally and theoretically. However the role of the non-Newtonian fluid in the ciliary transport system remains largely unknown. Here we use a one-way-coupled immersed boundary method to evaluate the impacts of viscoelastic fluid (Oldroyd-B fluid) on the fluid transport generated by an array of rabbit tracheal cilia beating in a channel at low Reynolds number. Our results show that the viscoelasticity could enhance the fluid transport generated by the rabbit tracheal cilia beating pattern and the flow is sensitive to the Deborah number in the range we investigate.

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