

Taylor's Swimming Sheet near a Soft Wall

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In 1951, G.I. Taylor [1] modelled swimming organisms by hypothesizing a 2D infinite sheet swimming due to a wave passing through it. This simple model not only captured the ability to swim as a result of wavy motion of the flagella but further development into the model captured the optimal nature of metachronal waves observed in ciliates. While the effect of confinement near rigid walls was studied by Katz [2] and Reynolds [3], we focus on the correction to swimming velocity generated due to the softness of the wall. By following the analysis akin to the studies on lift forces observed near soft gels and elastomers, we explore whether this softness of the boundary can enhance the swimming velocity of the micro-organism or not, for a small compliance of the wall.

References

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