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Geometric optimization of helical tail designs to calibrate swimming velocities of microswimmers EBRU DEMIR, SERHAT YESILYURT, Sabanci University — Artificial microswimmers present both a solution and a challenge as alternative tools to be used in medical applications, namely, drug delivery and minimally invasive surgeries. Achieving desired amount of controlled displacement of microswimmers at desired velocities plays an important role in determining the success of such applications. In this study, a non-dimensionalised CFD model is utilised to investigate the effects of various geometrical parameters on swimming velocities of microswimmers with helical tails in cylindrical confinements, such as helix wavelength, helical body thickness, and diameter. To this end, a "one wavelength long" helical tail is placed inside a cylindrical channel of the same length with periodic boundary conditions applied to both ends, constituting an infinite helix model. As the channel diameter is kept constant, a parametric study of abovementioned geometric identities is conducted to observe the change in the swimming velocities. Furthermore, effects of helix-channel eccentricity and helix rotation about the longitudinal axis on swimming velocity of a dimensionally optimized helix are investigated to reveal near wall effects. The results are found to be in good agreement with the theoretical models existing in the literature.

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