Optimal Stroke Patterns for Purcell's Three-Link Swimmer
DANIEL TAM, ANETTE HOSOI, Massachusetts Institute of Technology — This study focuses on the optimal swimming of Purcell's three link swimmer. We model the swimmer as a jointed chain of three links moving in a inertialess flow using slenderbody theory. The kinematics and the geometry of the swimmer is optimized for efficiency and speed. The parametrization of the stroke is developed in Fourier series and the optimal stroke is found via a gradient type search on a finite set of the Fourier coefficients using a modified Newton algorithm. We were able to attain swimmer designs significantly more efficient than those previously suggested by authors who only consider geometric design rather than kinematic criteria (Becker, Koehler and Stone 2003). The influence of slenderness on optimality is considered as well.

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