

Abstract Submitted
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Synchronization of Swimming Microorganisms GWYNN ELFRING,
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of California San Diego — Flagellated eukaryotic cells (such as spermatozoa) have
been observed to synchronize their flagella when swimming in close proximity. Using
a 2D model, we find that hydrodynamic interactions alone can lead to synchroniza-
tion if the waveforms of the flagella display front-back asymmetry. Depending on the
nature of the asymmetry, the phase-locked conformation can minimize or maximize
the energy dissipated by the co-swimming cells. We show that due to kinematic
reversibility, this front-back asymmetry is necessary for synchronization in a New-
tonian fluid, and discuss the differences in a non-Newtonian fluid.

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