Abstract Submitted
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On the role of reduction by symmetry in understanding swimming at mid-Reynolds[1] HENRY JACOBS, Imperial College London — A number of numerical and experimental studies suggest suggest that swimming can be characterized as an emergent phenomena arising from time-periodic internal body forces. In particular, it seems reasonable to surmise that swimming can be characterized as a relative limit cycle. A relative limit cycle is a system trajectory with a time-period, wherein each period is related to the previous by the action of a Lie group. In the case of swimming in R^n this Lie group is the set of rotations and translations, $\mathrm{SE}(n)$. In this talk we will describe a class of dissipative systems which admit relative limit cycles. Unfortunately, the Navier-Stokes equations coupled to a solids in R^n are not within this class of. However, a Navier-Stokes-α fluid on the n-sphere, S^n, could resolve this issue. The relative limit cycles would be with respect to the group $\mathrm{SO}(n)$. In a very precise sense, the group $\mathrm{SO}(n)$ is to the S^n as $\mathrm{SE}(n)$ is to R^n. As a result, the relative limit cycles obtained on S^n, can be characterized as spatially localized manifestations of trajectories for systems in R^n wherein each period related to the next by a rigid rotation and translation.

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