Abstract Submitted
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Kinematic Matrix Analysis of Biological Swimmers and Artificial Nanomotors[1] AMIR NOURHANI, PAUL LAMMERT, Phys. Dept., Penn State University, ALI BORHAN, Chem. Eng. Dept., Penn State University, VINCENT CRESPI, Phys. Dept., Penn State University — In recent years, much attention has been attracted by autonomous movers (both natural, often biological, and synthetic) which exhibit a basic deterministic motion significantly perturbed by stochastic elements. Fokker-Planck equations are a traditional tool for investigating such phenomena, but can be cumbersome to apply, especially in complex situations of the sort now attracting attention. This is partly due to their giving complete probability distributions, which is a level of detail seldom needed, and potentially obscuring of the basic physics. We present a simple yet powerful new approach which can flexibly and easily handle a large variety of elementary deterministic and stochastic component processes to yield drift and diffusion characteristics with a minimum of fuss and effort. We use the clarity and power of the new methodology to discern several new universal emergent time scales in this class of physical systems. We also describe how these methods could now serve as a platform for further advances and insights.

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