Transmutation of rotational motion into translational diffusion in 3D rotary powered random walkers AMIR NOURHANI, PAUL LAMMERT, Phys. Dept., Penn State, ALI BORHAN, Chem. Eng. Dept., Penn State, VINCENT CRESPI, Phys. Dept., Penn State — Experimenters have for several years been studying motors with sizes in the 10^{-1}–10^{0} micron range which execute circular motion on scales as small as the motor dimensions in an aqueous environment. Previously, we have studied the normal situation wherein the motor is confined to a plane. Here we consider the case where such confinement is absent. The orbital motion of a particle undergoing regular circular motion in 3D has three rotational degrees of freedom. The introduction of stochasticity into them gives rise to 3D translational motion. A special, and apparently experimentally relevant, case is that of an orbiter in the plane which can flip over, reversing its chirality. We present analytical and simulation results on these transmutations of rotational motion into translational motion

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