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Rotors in low Re fluid: interactions and dynamics near a wall
ENKELEIDA LUSHI, PETIA VLAHOVSKA, Brown University — Active suspensions exhibit many interesting phenomena, e.g., self-organization and pattern formation. While collections of swimmers, which translate, have been extensively studied, rotors have received limited attention. We present a minimal model and numerical method to study the behaviour of externally or internally driven rotors in low Reynolds number flow. The rotors interact with each-other via the fluid as well as via excluded volumes. We discuss the coupled dynamics of two or more such particles, and their behaviour near a wall. Two same-spin rotors oscillate about their own center of mass with the oscillation time-scale depending on the particle aspect ratio, while their slow dynamics describes a large circular trajectory about the pair's center of mass. Two opposite-spin rotors perform, on average, co-operative self-propulsion in the direction perpendicular to their separation as well as oscillate about their centres of mass. A single rotor can move along a wall as it performs a co-operative self-propulsion with its own image. Last, we discuss the coupled dynamics and trajectories of many rotors.

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