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A new analysis methodology for the motion of self-propelled particles and its application YOUNG-MOO BYUN, PAUL LAMMERT, VINCENT CRESPI, Penn State University — The self-propelled particle (SPP) on the microscale in the solution is a growing field of study, which has a potential to be used for nanomedicine and nanorobots. However, little detailed quantitative analysis on the motion of the SPP has been performed so far because its self-propelled motion is strongly coupled to Brownian motion, which makes the extraction of intrinsic propulsion mechanisms problematic, leading to inconsistent conclusions. Here, we present a novel way to decompose the motion of the SPP into self-propelled and Brownian components; accurate values for self-propulsion speed and diffusion coefficients of the SPP are obtained for the first time. Then, we apply our analysis methodology to ostensible chemotaxis of SPP, and reveal the actual (non-chemotactic) mechanism of the phenomenon, demonstrating that our analysis methodology is a powerful and reliable tool.

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