Effect of activity on target search with resetting in thermal environment

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Stochastic resetting has recently emerged as an efficient target-searching strategy in various physical and biological systems. In particular, the strategy has been shown to be quite useful when the search is being conducted in a high noisy medium or in uncertain environmental conditions. Recent works have shown such effects in microscopic diffusive and other stochastic search processes. In this work, we explore the effects of stochastic resetting on an active system namely a self-propelled run and tumble particle immersed in a thermal bath. In particular, we assume that the position of the particle is reset at a fixed rate with or without reversing the direction of self-propelled velocity. Using standard renewal techniques, we compute the mean search time of this active particle to a fixed target and investigate the interplay between the activity and the thermal fluctuations. We find that the active search can outperform the Brownian search when the magnitude and flipping rate of self-propelled velocity are large and the strength of environmental noise is small. Notably, we find that the presence of environment via the thermal noise helps in reducing the mean first passage time of the run and tumble particle compared to the non-thermal one. Finally, we observe that reversing the direction of self-propelled velocity while resetting can also reduce the overall search time.