How to catch a microswimmer IVAN TANASIJEVIC, ERIC LAUGA, University of Cambridge — An active particle swimming in a flow undergoing solid-body rotation always ends up diverging away from the centre of rotation. Is it possible to design a Stokes flow vortex that would trap an active particle? We address mathematically the fate of swimmers modelled as spheres, or prolate spheroids, swimming with prescribed velocities in a number of elementary vortical flows in 2D and 3D. We predict theoretically the existence of bounded orbits, which are confirmed by numerical simulations. We also address the role of fluctuations for the swimmer. These results open the possibility of designing microswimmer traps, thereby facilitating biophysical studies of cell motility.

Ivan Tanasijevic
University of Cambridge