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Discrete population dynamics in flows[1] PRASAD PERLEKAR, Department of Applied Physics, Eindhoven University of Technology, The Netherlands, ROBERTO BENZI, LUCA BIFERALE, Department of Physics, University of Tor Vergata, Italy, HERMAN CLERCX, Department of Applied Physics, Eindhoven University of Technology, The Netherlands, SIMONE PIGOLOTTI, Dept. de Fisica i Eng. Nuclear, Universitat Politecnica de Catalunya Edif. GAIA, Spain, MOGENS JENSEN, The Neils Bohr Institut, Copenhagen, Denmark, DAVID NELSON, Lyman Laboratory of Physics, Harvard University, Cambridge, USA, FEDERICO TOSCHI, Department of Applied Physics, Eindhoven University of Technology, The Netherlands — Bacteria and plankton populations living in oceans and lakes reproduce and die under the influence of turbulent currents. Fluid transport interacts in a complex way with the dynamics of populations because the typical reproduction time of microorganism is comparable with the time scale of the flows. We review recent results on the population dynamics for off-lattice models. We then investigate the role of chaotic/turbulent flows on the dynamic of populations. The populations are modeled as discrete entities (particles) that reproduce, die, and compete with each other. Furthermore, to mimic various seggregation mechanisms like gyrotaxis, chemotaxis, and/or food variability we associate an inertia with the entities. We show that the presence of advecting flows with same "inertial" entities leads to a dramatic reduction in the population sizes and fixation times. We also discuss the interesting case of species with slightly different inertial properties where a long coexistence of species is possible.

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