

# The entropy production rate of active matter systems

Derek Frydel

*Federico Santa Maria Technical University, Santiago, Chile*

The entropy production rate (EPR) quantifies a distance from equilibrium. It is quite a relevant concept for active particle systems which take up and dissipate energy, the process which takes the system out-of-equilibrium. We consider canonical theoretical models of non-interactive active particles. Our aim is to provide an intuitive formulation and interpretation of the concept of EPR. Based on the connection between the EPR and the dissipation of energy, we obtain several alternative formulations of EPR. For certain simple situations, such as particles confined in a harmonic trap and particles between rigid walls, we obtain exact results which provide a straightforward understanding and interpretation of emerging behaviors. In addition, we discuss the role of inertia in formulating the EPR and emphasize that a complete theoretical framework must incorporate inertia if correct limiting behaviors are to be recovered. Lastly, we point out certain circumstances where the definition of the EPR becomes ambiguous.