Geometric integration for the formation control of multi-agent systems
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Formation control of autonomous agents can be seen as a physical system of individuals interacting with local potentials, and whose evolution can be described by a Lagrangian function. We construct variational integrators for the formation control of autonomous agents modeled by double integrators. In particular, we find error estimations for the rate of the energy dissipated along with the agents' motion to achieve desired formations. Consequently, this permits to provide sufficient conditions on the time step for the convergence of discrete formation control systems such as the consensus problem in discrete systems.

We present practical applications such as the rapid estimation of regions of attraction to desired shapes in distance-based formation control.