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Collision avoidance mechanism for symmetric circular formations of mobile agents

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Collective motion is a promising field that studies how local interactions lead groups of individuals to global behaviors. Biologists try to understand how those subjects interplay in nature, and engineers are concerned with the application of interaction strategies to mobile vehicles, satellites, robots, etc. There are several models in literature that employ strategies observed in groups of beings in nature. The aim is not to literally mimic them, but to extract suitable strategies for the chosen application. These models, constituted of multiple mobile agents, can be used in tasks such as data collection, surveillance, monitoring, etc. One approach is to use phase-coupled oscillators to design the mobile agents, in which each member is an oscillator and they are coupled according to an interconnection network. This design usually do not keep track and handle the possible collisions among the group, and real applications obviously must manage these situations to prevent the equipment to crash. We then introduce a collision avoidance mechanism to a model of particles with phase-coupled oscillators dynamics for symmetric circular formations.

Nonlinear systems. Phase-coupled oscillators. Mobile agents. Collective motion.