

Title—Bearing-Only Formation Tracking Control for Multi-Agent Systems with Time-Varying Velocity Leaders

Keywords—Bearing-only formation control, formation tracking, multi-agent systems.

Abstract—This letter studies the bearing-only formation tracking control problem for multi-agent systems in which the target formation moves with a time-varying reference velocity. We first consider both single-integrator and double-integrator models and propose two control laws for them that can achieve this formation tracking control using only bearing measurements, without any other measurements or communication between agents. Moreover, these two control laws can be extended to deal with the system with bounded disturbances. The convergence of the systems under these two control methods is proven by rigorous mathematical derivations and simultaneously validated by numerical simulations.

Main contribution—Firstly, for a MAS with time-varying velocity leaders, for the first time, we propose bearing-only formation tracking control methods for both single and double integrators, which use only bearing measurements, without using communication between agents. Secondly, with a minor modification, these two methods can be extended to address the single and double integrators with bounded disturbances.

Conclusion—In this letter, we focused on bearing-only formation tracking control problem and removed its restriction that the leaders' velocity can only be a constant. Two control laws have been proposed to address this topic for single and double-integrator agents, using only bearing measurements and without communication between agents. In addition, these two methods can be extended to deal with integrators with bounded disturbance with only minor changes. Achieving these goals using bearing measurements in the local framework would be an interesting topic in the future.