



LEADERLESS AND LEADER-FOLLOWING FLOCKING MOTION VIA COORDINATED CONTROL

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Abstract- In this paper, novel coordinated control strategies are presented for control and analysis of multi-agents with point mass dynamics to achieve leaderless and leader-following flocking motions. Four control laws are proposed for a group of agents to achieve flocking formations. Two of them are for leaderless flocking and two for leader-following flocking relative to two different centers (mass center and geometric center) of the flock, respectively. A distance-dependent adjacency matrix is used to quantify the way agents influence each other. Stability analysis of the control systems is conducted based on the classical Lyapunov theory to indicate the flocking behaviors (cohesiveness, collision avoidance and velocity matching) of the systems. Finally, simulation examples are given to validate the theoretical results.

Index terms: Flocking motion, multi-agent, coordinated control.