

Optimal control through leadership of multi-agent systems

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Abstract: A new control strategy for a refined flocking model and for Hegselmann-Krause (HK) opinion formation models is discussed. This strategy considers the presence of a controlled leader in the multi-agent models in order to develop a control strategy to accomplish desired objectives. Specifically, a model predictive control scheme is proposed that requires the solution of a sequence of open-loop optimality systems. An appropriate Runge-Kutta scheme to discretize the optimality systems and a nonlinear conjugate gradient solver are implemented and discussed. Numerical experiments are performed to investigate the properties of the models and to demonstrate the ability of the control strategy to drive the flocking model to attain a desired target configuration and to follow a given trajectory and to drive the opinion system to attain a consensus.