

Hydrodynamic Cucker-Smale flocking models

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ABSTRACT

We first discuss the Cucker-Smale flocking models at the particle level and kinetic level, and the asymptotic behaviors of the solutions. We then derive the hydrodynamic model of the pressureless Euler equations with a nonlocal flocking dissipation term, which describes the dynamics of a large number of the Cucker-Smale particles in a collision free regime. For the proposed hydrodynamic model, we discuss the global well-posedness of classical solutions, and show that the classical solutions exhibit the asymptotic flocking as time goes on. If time permits, we also discuss about some recent progress on free boundary problem arising in the hydrodynamic flocking model.

REFERENCES

1. S.-Y. Ha, M.-J. Kang, and B. Kwon, *A hydrodynamic model for the interaction of Cucker-Smale particles and incompressible fluid*, submitted, 2013.