Kinetic equations for swarming: mean field limit and qualitative properties

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I will present a kinetic theory for swarming systems of interacting, self-propelled discrete particles. Starting from the particle model, one can construct solutions to a Vlasov-like kinetic equation for the single particle probability distribution function using distances between measures. I will also analyse the asymptotic behavior of solutions of the continuous kinetic version of flocking by Cucker and Smale, which describes the collective behavior of an ensemble of organisms, animals or devices. The large-time behavior of the distribution in phase space is subsequently studied by means of particle approximations and a stability property in distances between measures. A continuous analogue of the theorems of Cucker-Smale will be shown to hold for the solutions on the kinetic model. More precisely, the solutions concentrate exponentially fast their velocity to their mean while in space they will converge towards a translational flocking solution. The mean field limit with/without noise for the Cucker-Smale model will also be discussed.