

Seminar 2021

Math

A mean-field limit of the Cucker-Smale model on complete Riemannian manifolds

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Abstract: In this talk, we cover a mean-field limit of the Cucker-Smale(C-S) model for flocking on complete smooth Riemannian manifolds. For this, we first study a formal derivation of the kinetic C-S model on manifolds using the BBGKY hierarchy and several a priori estimates on emergent dynamics. Then, we discuss a rigorous mean-field limit from the particle model to the corresponding kinetic model by using the generalized particle-in-cell method. As a byproduct of our rigorous mean-field limit estimate, we also see a global existence of a measure-valued solution for the derived kinetic model. Compared to the corresponding results on $\mathbb{R}^d$, our procedure requires additional assumption on holonomy and proper a priori bound on the derivative of parallel transports. As a concrete example, we will verify that the hyperbolic space $\mathbb{H}^d$ satisfies our proposed standing assumptions.



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