First order non-instantaneous corrections in collisional kinetic models

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In this talk we introduce a new class of kinetic models, which overcome the standard assumption in kinetic transport theory that collision processes happen instantaneously. In particular, this modelling approach is interesting for applications in life-science, where the interaction-time be- tween biological agents cannot meaningfully be neglected. On the level of the underlining stochastic processes this results in replacing the jump-process, which are defining the collisions, with continuous stochastic processes. As an example, we will investigate a kinetic model with non-instantaneous align- ment collisions between particles. The collisions are described by a transport process in the joint state space of the colliding particles, where the states of the particles approach their midpoint. Moreover, we will elaborate on the question, which model can be used as an accurate first order non-instantaneous correction in the regime where the collision time is very small, implying that the collisions are almost instantaneous. Last, the instantaneous limit will be considered, where the latter leads to standard collisional kinetic models of Boltzmann type.
This is joint work with Carmela Moschella, Christian Schmeiser and Veronica Tora

Références

[1] L.Kanzler, C. Moschella, C. Schmeiser, *First order non-instantaneous corrections in collisional kinetic alignment models*, arXiv:2503.05686.

[2] L. Kanzler, C. Schmeiser, V. Tora, *Two kinetic models for non-instantaneous binary alignment collisions*, Kinetic & Related Models, 17(5), (2024), pp : 697-712., doi : 10.3934/krm.2023038

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