Kinetic Modelling and Control of Multiagent Systems with Missing Information

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Kinetic equations play a leading role in the modelling of large systems of interacting particles/agents with a recognized effectiveness in describing real world phenomena ranging from plasma physics to multi-agent dynamics. The derivation of these models has often to deal with physical, or even social, forces that are deduced empirically and of which we have limited information [1]. To produce realistic descriptions of the underlying systems, it is of paramount importance to quantify the propagation of uncertain quantities across the scales.

We concentrate on the interplay of this class of models with collective phenomena in life and social sciences, where the assessment of uncertainties in data assimilation is crucial to design efficient interventions. Furthermore, to discuss the mathematical interface of this class of models with available data, we derive the evolution of observable quantities based on suitable macroscopic limits of classical kinetic theory [2, 3]. Finally, we analyze how the introduction of robust control strategies leads to the damping of the uncertainties characterizing the system at the macroscopic level [4].

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