Thermostatted Kinetic Models with Applications to Biological Systems, Crowds and Swarms  

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Abstract:

This paper is concerned with the development of a new general framework of the kinetic theory suitable for the modeling of systems where the action of an external force is modulated by a complex microstate-dependent feedback mechanism. The framework is based on the interaction of a large number of individual systems which are driven by a common external force. The models are used to study the behavior of the system under different conditions and to understand the role of the feedback mechanism in the macroscopic behavior. The results are compared with existing models and the implications of the new framework are discussed.  

1 Introduction

The kinetic theory of complex systems is a powerful tool for understanding the behavior of systems composed of a large number of interacting components. The theory is based on the assumption that the system can be described by a set of macroscopic parameters, such as temperature, pressure, and chemical potential, which are functions of the microscopic state of the system. The theory is used to study the behavior of systems under different conditions and to understand the role of the feedback mechanism in the macroscopic behavior. The results are compared with existing models and the implications of the new framework are discussed.  

2 Thermostatted Kinetic Models with Applications to Biological Systems, Crowds and Swarms

This subsection introduces a mathematical framework for complex systems characterized by a full discrete microscopic state. The framework is based on the interaction of a large number of individual systems which are driven by a common external force. The models are used to study the behavior of the system under different conditions and to understand the role of the feedback mechanism in the macroscopic behavior. The results are compared with existing models and the implications of the new framework are discussed.  

3 Critical Analysis and Research Perspectives

The critical analysis and research perspectives are discussed in this section. The analysis is based on the interaction of a large number of individual systems which are driven by a common external force. The models are used to study the behavior of the system under different conditions and to understand the role of the feedback mechanism in the macroscopic behavior. The results are compared with existing models and the implications of the new framework are discussed.  

References