



Brownian dynamics of active and passive anisotropic colloidal particles

By Raphael Wittkowski

Shaker Verlag Okt 2012, 2012. Buch. Condition: Neu. Neuware - The proper description of the static equilibrium properties and the dynamic behavior of many-particle systems is one of the oldest problems in theoretical physics. This very general problem is highly relevant for most fields of physics. In the present work, several aspects in the context of this problem are investigated. These aspects concern the Brownian dynamics of interacting anisotropic colloidal particles, that can be passive (colloidal liquid crystals) or active (self-propelled microswimmers). The main part of this work is subdivided into three chapters. In the first chapter, the Brownian dynamics of an individual active colloidal particle with arbitrary shape is investigated. After the formulation of the corresponding Langevin equation, analytical solutions for some special cases are derived and numerical solutions for more general situations are presented. Taking the example of a spherical colloidal particle, the effect of an imposed shear flow is discussed also. The second chapter considers the collective dynamics of a large set of interacting active colloidal particles with arbitrary shape. Starting from the appropriate many-particle Smoluchowski equation, classical dynamical density functional theory is generalized to arbitrarily shaped active or passive colloidal particles. It is proved, that this...



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