

## Mathematical Physics

# On Rigorous Derivation of the Enskog Kinetic Equation

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*(Submitted on 27 Jul 2011 (v1), last revised 25 Apr 2012 (this version, v2))*

We develop a rigorous formalism for the description of the kinetic evolution of infinitely many hard spheres. On the basis of the kinetic cluster expansions of cumulants of groups of operators of finitely many hard spheres the nonlinear kinetic Enskog equation and its generalizations are justified. It is established that for initial states which are specified in terms of one-particle distribution functions the description of the evolution by the Cauchy problem of the BBGKY hierarchy and by the Cauchy problem of the generalized Enskog kinetic equation together with a sequence of explicitly defined functionals of a solution of stated kinetic equation is an equivalent. For the initial-value problem of the generalized Enskog equation the existence theorem is proved in the space of integrable functions.

Comments: 28 pages

Subjects: **Mathematical Physics (math-ph)**; Statistical Mechanics (cond-mat.stat-mech); Analysis of PDEs (math.AP)

MSC classes: 35Q20, 35Q82, 47J35, 82C05, 82C40

Journal reference: Kinet. Relat. Models 5 (3) (2012) 459-484

DOI: [10.3934/krm.2012.5.459](https://doi.org/10.3934/krm.2012.5.459)Cite as: [arXiv:1107.5572 \[math-ph\]](https://arxiv.org/abs/1107.5572)(or [arXiv:1107.5572v2 \[math-ph\]](https://arxiv.org/abs/1107.5572v2) for this version)

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