

## Accepted Manuscript

Derivation of equations of multimoment hydrodynamics for a gas of particles with internal structure

Igor V. Lebed

PII: S0378-4371(18)31288-3  
DOI: <https://doi.org/10.1016/j.physa.2018.09.166>  
Reference: PHYSA 20227

To appear in: *Physica A*

Received date: 29 May 2018

Please cite this article as: I.V. Lebed, Derivation of equations of multimoment hydrodynamics for a gas of particles with internal structure, *Physica A* (2018), <https://doi.org/10.1016/j.physa.2018.09.166>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



DERIVATION OF EQUATIONS OF MULTIMOMENT HYDRODYNAMICS  
FOR A GAS OF PARTICLES WITH INTERNAL STRUCTURE

Igor V. Lebed

Institute of Applied Mechanics, Russian Academy of Sciences  
Leningradsky prt 7, Moscow, Russian Federation, 125080  
lebed-ivl@yandex.ru

**Abstract**

The equations for pair distribution functions are used to derive the equations of multimoment hydrodynamics for a gas of particles with internal structure. The equations for pair functions are derived in terms of semi-classical approximation. The basic property of the pair functions is established in conformity with basic property, these functions remain unchanged in time along the trajectory of the inertia center of pair. The basic property of the pair distribution functions reveals the existence of infinite number of principle hydrodynamic values. The equations of multimoment hydrodynamics are constructed using limited number of principle hydrodynamic values. Selected principle values specify measurable moments. The measurable moments are represented by linear combination of principle and non-principle hydrodynamic values. The general structure of constructed multimoment conservation laws is identical to the structure of appropriate multimoment conservation laws in a gas of structureless particles. Each of the multimoment conservation laws is divided into two separate equations. The first group of conservation equations corresponds to convective phenomena. The second group of conservation equations corresponds to dissipative phenomena. Derived equations of multimoment hydrodynamics are designed for interpreting the behavior of medium states, which are far removed from the state of statistical equilibrium. Classic hydrodynamics encountered the problems when interpreting the unstable phenomena. The possibility of improvement of classic hydrodynamics equations for a gas of particles with internal structure is sought on the way toward an increase in the number of principle hydrodynamic values.

**Keywords:** Multimoment Hydrodynamics, Pair Distribution Functions, Instability

Download English Version:

<https://daneshyari.com/en/article/12145051>

Download Persian Version:

<https://daneshyari.com/article/12145051>

[Daneshyari.com](https://daneshyari.com)