*Journal of Statistical Physics, Vol. 77, Nos. 5/6, 1994*

# In Memory of Nina Borisovna Maslova

Nina Borisovna Maslova belonged to a very small group who in my mind personify the best features of her generation of the Soviet Russian intelligentsia. Many people will remember the extraordinary independence and firmness of her judgments. Her life was short, not always simple, and sometimes tragic.

Maslova is at present best known for her work in the area of the mathematical theory of kinetic equations. She started her scientific career at Leningrad State University with papers in statistical physics devoted to the derivation of equations for relativistic kinetic theory. However, her yearning for clarity and rigor, and her dissatisfaction with a physics style of arguing, resulted in her turning to the mathematical part of kinetic theory.

The mathematical theory of kinetic equations is now a classical branch of mathematical physics. Maslova and her school made great contributions to the establishment and development of this science.

It is difficult for us to imagine the effort that was needed to develop the mathematical theory of the Boltzmann equation from the works of Carleman to its contemporary stage. The history of the subject is marked by many results and ideas of Maslova. She made very early progress in the analytical theory of the Boltzmann equation for Maxwellian molecules, which was later developed by other authors. Maslova also generalized some classical results of Carleman to the case of general type collisions between molecules. She and her students obtained their first global results on the Cauchy problem for the nonlinear Boltzmann equation in the spatially nonuniform case simultaneously with and independently of the Japanese school.

The mathematical theory of nonlinear kinetic equations required a long time for creating its specific mathematical tools. Some crucial ideas first appeared in special cases and were only later independently discovered by others to have applications in the general case. Such was the case with the idea of averaging regularity of the transport operator. Maslova suggested a proof of compactness for an integral form of the linearized Boltzmann equation, which contained one of the first variants of the above idea.



0022-4715/94/1200-1049$07.00/0 

Among her central and classical results were the conditions for existence of a solution to an external boundary value problem for the nonlinear Boltzmann equation. The difficulty of this problem consists in the fact that it is impossible to give a straightforward proof based on the principle of small perturbations. The nonlinear part of the Boltzmann equation is such that the standard iterations analogous to those effective for the Navier–Stokes equations fail since such iterations leave the domain of the linearized equation. This obstacle is caused by the kinetic Stokes paradox. A major achievement of Maslova was its removal, which required a refined analysis of the asymptotic properties for the fundamental solution of the Oseen-type linearization of the Boltzmann equation. These asymptotics determine the conditions for existence and also the structure of the solutions.

In the later 1970s Maslova together with the students discussed a strategy for applying mathematical results of kinetic equations in order to obtain new results for fluid mechanics equations. Lately we have seen many successful attempts to use this kinetic method both for theoretical and numerical applications. Maslova was one of the first who realilzed the significance and possibility of such an approach. Key aspects are presented in her monograph written during the last year of her life, *Nonlinear Evolution Equations. Kinetic Approach.*

Maslova had a deep influence on her colleagues and on students of Leningrad University. For many years she was a very popular teacher of analysis at the Faculty of Mathematics and Mechanics. During the last few years colleagues in many countries had the opportunity and pleasure to collaborate with her.

Everybody who knew Maslova will remember the bright spark from this outstanding woman. Her leading principles in science during her entire career were rigor and devotion. Her main characteristics in life were extraordinary fearlessness and independence.

Alexei Heintz
*Department of Mathematics and Mechanics*
*St. Petersburg University*
*198904 St. Petersburg, Russia*
*E-mail: heintz@niimm.spb.su*