From Boltzmann to Euler: Hilbert's 6th problem revisited

Marshall Slemrod

Department of Mathematics, University of Wisconsin, Madison, USA
Department of Mathematics, Weizmann Institute of Science, Rehovot, Israel

This talk addresses the hydrodynamic limit of the Boltzmann equation, namely the compressible Euler equations of gas dynamics. An exact summation of the Chapman–Enskog expansion originally given by Gorban and Karlin is the key to the analysis. An appraisal of the role of viscosity and capillarity in the limiting process is then given where the analogy is drawn to the limit of the Korteweg–de Vries–Burgers equations as a small parameter tends to zero.