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Pavlo Cherepanov* (pavel@math.unm.edu), Department of Mathematics and Statistics,
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Navier-Stokes and Bhatnagar-Gross-Krook equations.*

The dynamics of compressible viscous flow can be described by the well developed theory of thermodynamics and fluid mechanics leading to a continuum model. At the same time, kinetic models aim to address the same problem from a more fundamental and completely different view point. In contrast to the continuum approach, kinetic theory allows a description of a system and its characteristics from the microscopic picture of the underlying processes based on the microscopic collision dynamics. The task of comparing these approaches and explaining how they are related is a major challenge for applied mathematics.

In this work we address a small aspect of this problem. It is known that the equations of Navier-Stokes can produce viscous shock profiles. We investigate whether similar types of solutions can be obtained from one of the kinetic models the Bhatnagar-Gross-Krook model introduced in 1954. We evaluate both models numerically and compare the results. (Received February 23, 2010)