Resolving the Shock Wave Profile in Viscous Fluids KENNETH
JORDAN, JOHN BORG, Marquette University — Capturing and modeling shock
wave profiles has a long history in computational analysis. Often artificial irre-
versibilities and/or smearing schemes are implemented in order to stabilize and
resolve the shock. This work presents a direct numeric simulation of the full Navier-
Stokes equations where the shock profile is completely resolved without the use of
artificial viscosity or shock smearing techniques. Several viscosity models are em-
ployed to study the role of viscosity on this second order accurate finite difference
scheme. The results are compared to an analytic solutions and experimental re-
sults. The results indicated that the shock front thickness and entropy production
are in good agreement with simple analytic solutions and experimental results. The
extension of this technique to solid and granular materials will be discussed.

Kenneth Jordan
Marquette University

Date submitted: 28 Feb 2011   Electronic form version 1.4