Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Dynamically Adaptive Wavelet Collocation Method for Shock Computations[1] JONATHAN REGELE, OLEG VASILYEV, University of Colorado at Boulder — Most explicit TVD schemes make use of artificial viscosity to reduce oscillations and avoid the stability requirements that an explicitly written dissipation term would require when solving hyperbolic conservation equations. In this talk an adaptive wavelet collocation method for shock computation is described. The method for determining a shock's location is similar to Harten's multiresolution algorithm, but its implementation is more continuous. The presence of wavelet coefficients on the finest level of resolution indicates that the maximum allowed resolution has been reached and localized artificial viscous terms should be added to smooth the solution. The localized viscosity is constructed by creating a mask of the wavelet coefficients on the finest level that are greater than a given threshold parameter. The mask is smoothed to reduce oscillations that can be induced due to spatial discontinuities in the second derivative. The main advantage of this technique are its generality and zero losses away from shocks. Since the viscosity is written explicitly, sonic points are no longer problematic and there is no need to track wind direction or introduce flux splitting. One- and two-dimensional examples are given and discussed.

[1]This research is supported by the National Science Foundation under grant No. ACI-0242457.

Jonathan Regele
University of Colorado at Boulder

Date submitted: 28 Jul 2005 Electronic form version 1.4