equation. Accurate solution of the problem requires the development of approximate boundary conditions which correctly model the physics of the unsteady flow in the far field. An accurate far field boundary condition is developed, and numerical results are presented using this condition. The stability of the scheme is discussed, and the stability restriction for the scheme is established as a function of the Mach number. Finally, comparisons are made with the frequency domain calculations by Scott and Atassi, and the relative strengths and weaknesses of each approach are assessed.

NUMERICAL ALGORITHMS FOR STRONG DISCONTINUITIES IN ELASTIC–PLASTIC SOLIDS. John A. Trangenstein and Richard B. Pember. *Computing and Mathematics Research Division, Lawrence Livermore National Laboratory L-316, P.O. Box 808, Livermore, California 94550, USA.*

In this paper the implementation of second-order Godunov methods for dynamic wave propagation in one-dimensional elastic–plastic solids is investigated. First, the Lagrangian form of the algorithm is reviewed, and then the algorithm is extended to the Eulerian frame of reference. This extension requires additional evolution equations to handle the history of the material along particle paths. Both the Lagrangian and Eulerian versions of the algorithm require appropriately accurate approximations to the solution of Riemann problems, in order to represent the interaction of waves at cell boundaries. Two inexpensive approximations to the solution of the Riemann problem are constructed, and the resulting algorithms are tested against the analytic solution of the Riemann problem for longitudinal motion in an elastic–plastic bar. These approximations to the Riemann problem are shown to work well, even for strong discontinuities. Finally, the numerical experience gained from the simple longitudinal bar problem is used to design an algorithm for strong shocks predicted by a realistic soil model.

A CLASS OF MONOTONE INTERPOLATION SCHEMES. Piotr K. Smolarkiewicz and Georg A. Grell. *National Center for Atmospheric Research, Boulder, Colorado 80307, USA.*

This paper discusses a class of monotone (nonoscillatory) interpolation schemes convenient for applications with a variety of problems arising in computational fluid dynamics. These interpolators derive from the flux-corrected-transport finite difference advection schemes. It is shown that any known dissipative advection algorithm may be implemented as an interpolation scheme. The resulting interpolation procedure retains the formal accuracy of the advection scheme and offers such attractive computational properties as preservation of a sign or monotonicity of the interpolated variable. The derived class of interpolators consists of schemes of different levels of accuracy, efficiency, and complexity, reflecting a rich variety of available advection schemes. Theoretical considerations are illustrated with idealized examples and selected applications to atmospheric fluid dynamics problems.

ON THE SUPPRESSION OF NUMERICAL OSCILLATIONS USING A NON-LINEAR FILTER. W. Shyy, M.-H. Chen, R. Mittal, and H. S. Udaykumar. *Department of Aerospace Engineering, Mechanics and Engineering Science, University of Florida, Gainesville, Florida 32611, USA.*

The idea of using a non-linear filtering algorithm to eliminate numerically generated oscillations is investigated. A detailed study is conducted to follow the development of numerical oscillations and their interaction with the filter. A relaxation procedure is also proposed to enhance the effectiveness of the filter. Three model problems, a 2D steady state scalar convection-diffusion equation, a 1D unsteady gas dynamics flow with shock and a 1D linear wave equation, have been designed to test the performance of the filtering algorithm. The effectiveness of the filter is assessed for convection schemes of different dispersive and diffusive characteristics, demonstrating that it is effective in eliminating oscillations with short wavelength, but oscillations of longer wavelengths are virtually unaffected. It is concluded that a proper combination of non-linear filter and dispersive numerical scheme is a viable alternative to dissipative schemes in resolving flows with sharp gradients and discontinuities.

PROJECTION METHODS COUPLED TO LEVEL SET INTERFACE TECHNIQUES. Jingyi Zhu and James Sethian. *Lawrence Berkeley Laboratory and Department of Mathematics, University of California, Berkeley, California 94720, USA.*

In this work, we consider the hydrodynamic problems with cold flame propagation by merging a second-order projection method for viscous Navier–Stokes equations with modern techniques for computing the motion of interfaces propagating with curvature-dependent speeds. This is part of the efforts in trying to approximate the solution of a simplified model of turbulent combustion. Results are given for a simple model of a flame burning in driven cavities and shear layers.

ADAPTIVE SPECTRAL METHODS WITH APPLICATION TO MIXING LAYER COMPUTATIONS. H. Guillard. *INRIA, Centre de Sophia-Antipolis, 2004 Av. des lucioles, 06565 Valbonne, France*; J. M. Male and R. Peyret. *Laboratoire de Mathématiques, CNRS UA-168, Université de Nice, Parc Valrose, 06034 Nice, France and INRIA, Centre de Sophia-Antipolis, 2004 Av de lucioles, 06565 Valbonne, France.*

This paper reports some experiments on the use of adaptive Chebyshev pseudospectral methods for compressible mixing layer computations. Different functionals measuring the optimality of the polynomial approximation are discussed and compared. In particular, we address the problem of the practical computation of the various functionals. The utility of the self-adaptive method is then demonstrated by some examples from compressible mixing layer calculations.