their ability to remove continuity violations, without adding vorticity, in channels that have been fitted with nonorthogonal MAC grids. Each of these combinations achieves conservation of mass, but only one of them makes the pressure gradient effectively irrotational. The latter condition is achieved by using identical approximations for coordinate derivatives and pressure derivatives throughout the flow, and by using one-sided approximations next to the boundaries for ambiguous derivatives in the off-boundary direction.

AUTOMATED ANGULAR MOMENTUM RECOUPLING ALGEBRA. H. T. Williams, *Washington and Lee University, Lexington, Virginia 24450, USA*; Richard R. Silbar, *Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545, USA.*

We present a set of heuristic rules for algebraic solution of angular momentum recoupling problems. The general problem reduces to that of finding an optimal path from one binary tree (representing the angular momentum coupling scheme for the reduced matrix element) to another (representing the sub-integrals and spin sums to be done). The method lends itself to implementation on a microcomputer, and we have developed such an implementation using a dialect of LISP. We describe both how our code, called RACAH, works and how it appears to the user. We illustrate the use of RACAH for several transition and scattering amplitudes matrix elements occurring in atomic, nuclear, and particle physics.

SIMULATION OF THE STEADY-STATE ENERGY TRANSFER IN RIGID BODIES, WITH CONVECTIVE/RADIATIVE BOUNDARY CONDITIONS, EMPLOYING A MINIMUM PRINCIPLE. Rogério Martins Saldanha da Gama, *Laboratório Nacional de Computação Cientifica, Rua Lauro Müller 455, 22290 Rio de Janeiro, Brazil.*

The subject of this paper is the energy transfer phenomenon in a rigid and opaque body that exchanges energy, with the environment, by convection and by diffuse thermal radiation. The considered phenomenon is described by a partial differential equation, subjected to (nonlinear) boundary conditions. It is presented with a minimum principle, suitable for a large class of energy transfer problems. Some particular cases are simulated.

A DOMAIN DECOMPOSITION METHOD FOR GENERATING ORTHOGONAL POLYNOMIALS FOR A GAUSSIAN WEIGHT ON A FINITE INTERVAL. Raymond C. Y. Chin, *Lawrence Livermore National Laboratory, Livermore, California 94550, USA.*

A domain decomposition method has been developed for generating orthogonal polynomials for a Gaussian weight on $(-1, 1)$. The method takes advantage of the underlying asymptotic structure of the orthogonal polynomials and, hence, it is *effective* in the sense that it makes maximal use of the analytic properties of the solution to increase accuracy and efficiency. These polynomials are necessary for constructing Gaussian quadrature formulas that are encountered in large quantum chemistry computational packages and in calculating the Compton scattering kernel and its associated angular moments.

A FRONT-TRACKING METHOD FOR VISCOUS, INCOMPRESSIBLE, MULTI-FLUID FLOWS. Salih Ozen Unverdi and Grétar Tryggvason, *The University of Michigan, Ann Arbor, Michigan 48109, USA.*

A method to simulate unsteady multi-fluid flows in which a sharp interface or a front separates incompressible fluids of different density and viscosity is described. The flow field is discretized by a conservative finite difference approximation on a stationary grid, and the interface is explicitly represented by a separate, unstructured grid that moves through the stationary grid. Since the interface deforms continuously, it is necessary to restructure its grid as the calculations proceed. In addition to keeping the density and viscosity stratification sharp, the tracked interface provides a natural way to include surface tension effects. Both two- and three-dimensional, full numerical simulations of bubble motion are presented.

EXPLICIT ADAPTIVE-GRID RADIATION MAGNETOHYDRODYNAMICS. Osman Yasar and Gregory A. Moses, *University of Wisconsin-Madison, Madison, Wisconsin 53706, USA.*

An explicit adaptive-grid finite differencing method for one-dimensional radiation magnetohydrodynamics computations is described. Based on the equidistribution principle, this explicit procedure moves the grid points to regions with high spatial gradients in physical quantities, such as temperature, mass density, pressure, and momentum. The governing magnetic field, radiative tansfer, and hydrodynamics equations are transformed to the moving adaptive reference frame. The time and spatially dependent radiation field is determined by solving the radiative transfer equation with the multigroup discrete ordinate S_N method with implicit time differencing. The magnetic field is solved through a diffusion equation resulted from Maxwell's equations and Ohm's law. The fluid equations are solved using a first-order upwind spatial differencing and explicit time differencing scheme. The coupling between the fluid and radiation field is treated explicitly by first solving for the radiation field and then the fluid equations. A conservative differencing scheme based on the control volume approach is chosen to retain the conservative nature of the governing equations.

A MICROINSTABILITY CODE FOR A UNIFORM MAGNETIZED PLASMA WITH AN ARBITRARY DISTRIBUTION FUNCTION. Y. Matsuda and Gary R. Smith, *Lawrence Livermore National Laboratory, Livermore, California 94550, USA.*

We have developed a very general computer code for studying micro-instabilities in a uniform magnetized plasma. Employing a new algorithm to perform two-dimensional numerical integrals in the conductivity tensor, the code can handle an arbitrary distribution function given by either an analytical function or numerical values on a momentum space grid and solve the full dispersion relation for an arbitrary propagation angle in either a non-relativistic or relativistic plasma except for a highly relative plasma (energy $\gg 1$ MeV). The results for cyclotron–maser instability and whistler–wave instability are presented to illustrate the validity of the method.

A BOUNDARY ELEMENT SOLUTION FOR TWO-DIMENSIONAL VISCOUS SINTERING. G. A. L. van de Vorst, R. M. M. Mattheij, and H. K. Kuiken, *University of Technology, P.O. Box 513, 5600 MB Eindhoven, The Netherlands.*

By viscous sintering is meant the processes in which a granular compact is heated to a temperature at which the viscosity of the material under consideration becomes low enough for surface tension to cause the powder particles to deform and coalesce. For the sake of simplicity this process is modeled in a two-dimensional space. The governing (Stokes) equations describe the deformation of a two-dimensional viscous liquid region under the influence of the curvature of the outer boundary. However, some extra conditions are needed to ensure that these equations can be solved uniquely. A boundary element method is applied to solve the equations for