Abstracts of Papers to Appear in Future Issues

TWO-GROUP APPROACH TO THE KINETICS OF PARTICLE CLUSTER AGGREGA-
TION. M. Vicanek and N. M. Ghoniem. *University of California,
Los Angeles, Los Angeles, California 90024, USA.*

We present a numerical scheme for the treatment of particle agglomera-
tion phenomena. The method is based on separating clusters into two
groups according to size: small clusters containing up to x^* atoms and
larger clusters with more than x^* atoms. In the first group, a set of equa-
tions describes the evolution of individual clusters; moment equations are
derived for the second group. These two sets of coupled equations are
solved numerically for, and giving good agreement with, a case where an
exact solution is available. In a second step, the full distribution function
is reconstructed from its moments. Here we use a nonlinear method based
on the maximum entropy principle. The superiority of this method over a
Gram–Charlier expansion is demonstrated for an example taken from the
condensation of atomic clusters on a surface.

SOLUTION OF SIMULTANEOUS PARTIAL DIFFERENTIAL EQUATIONS USING
DYNAMIC ADI: SOLUTION OF THE STREAMLINED DARWIN FIELD
EQUATIONS. D. W. Hewett, D. J. Larson, and S. Doss. *University of
California, Lawrence Livermore National Laboratory, Livermore,
California 94550, USA.*

We apply a particular version of ADI called Dynamic ADI (DADI) to
the strongly coupled 2nd-order partial differential equations that arise
from the streamlined Darwin field (SDF) equations. The DADI method is
applied in a form that we show is guaranteed to converge to the desired
solution of our finite difference equations. We give overviews of our test
case, the SDF problem, and the DADI method, with some justification for
our choice of operator splitting. Finally, we apply DADI to the strongly
coupled SDF equations and present the results from our test case. Our
implementation requires a factor of 7 less storage and has proven to be a
factor of 4 (in the worst case) to several orders of magnitude faster than
competing methods.

MULTI-DOMAIN CHEBYSHEV–FOURIER METHOD FOR THE SOLUTION OF THE
EQUATIONS OF MOTION OF DYNAMIC ELASTICITY. Ekkehart Tessmer.
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Germany*; David Kessler. *Tel Aviv University, Tel Aviv, Israel 69978*;
Dan Kosloff. *Institut für Geophysik, Universität Hamburg, D 2000
Hamburg, Germany, and Tel Aviv University, Tel Aviv, Israel 69978*;
Alfred Behle. *Institut für Geophysik, Universität Hamburg, D 2000
Hamburg, Germany.*

A multi-domain approach for the solution of the equations of elasticity
in two spatial dimensions is presented. The equations of momentum
conservation and the stress–strain relations are recast as a system of five
coupled equations in time in which the particle velocities and the stresses
are the unknowns. Solution schemes for both 2D Cartesian and polar coor-
dinates are derived. In both cases the solution is assumed periodic in one
coordinate (the x or θ directions) and nonperiodic in the other direction.
The numerical algorithm uses a Fourier expansion in the periodic direction
and domain decomposition and a modified Chebyshev expansion in the
remaining direction. The multi-domain approach is tested against
problems with known solutions. In all cases it appears as accurate as

solutions with a single domain. The multi-domain concept adds flexibility
and improves efficiency. It allows use of different grid sizes in different
regions depending on the material properties and allows a relatively
uniform grid spacing in the polar coordinate case.

COMPARISON OF COORDINATE-SPACE TECHNIQUES IN NUCLEAR MEAN-FIELD
CALCULATIONS. V. Blum. *Institut für Theoretische Physik der Univer-
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Universität Frankfurt a.M., Robert Mayer-Strasse 10, 6000 Frankfurt
a.M. 11, Germany*; P.-G. Reinhard. *Institut für Theoretische Physik der
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We investigate three different numerical representations for nuclear
mean-field calculations: finite differences, Fourier representation, and
basis-splines. We compare these schemes with respect to precision and
speed. It turns out that Fourier techniques and basis-splines are much
superior in precision to finite differences. The Fourier representation in
connection with the fast Fourier transformation is advantagous for large
grids whereas matrix techniques, derived either from basis-splines or from
Fourier representation, are preferable for smaller grids.

APPROXIMATE SOLUTIONS TO THE ZAKHAROV EQUATIONS VIA FINITE
DIFFERENCES. R. T. Glassey. *Indiana University, Bloomington, Indiana
47405, USA.*

An energy-preserving, linearly implicit finite-difference scheme is pre-
sented for computing solutions to the periodic initial-value problem for the
Zakharov equations. Solitary waves and colliding solitary waves are
computed, and a comparison is made with previous calculations.

UPWIND MONOTONIC INTERPOLATION METHODS FOR THE SOLUTION OF THE
TIME DEPENDENT RADIATIVE TRANSFER EQUATION. James M. Stone.
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Applications, University of Illinois at Urbana-Champaign, Urbana,
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USA.*

We describe the use of upwind monotonic interpolation methods for the
solution of the time-dependent radiative transfer equation in both optically
thin and thick media. These methods, originally developed to solve
Eulerian advection problems in hydrodynamics, have the ability to
propagate sharp features in the flow with very little numerical diffusion. We
consider the implementation of both explicit and implicit versions of the
method. The explicit version is able to keep radiation fronts resolved
to only a few zones wide when higher order interpolation methods are
used. Although traditional implementations of the implicit version suffer
from large numerical diffusion, we describe an implicit method which
considerably reduces this diffusion.