Abstracts of Papers to Appear in Future Issues

STUDIES OF PLASMA EQUILIBRIUM AND TRANSPORT IN A TOKAMAK FUSION DEVICE WITH THE INVERSE-VARIABLE TECHNIQUE. R. R. Khayrutdinov. *Institute for Fusion Studies, The University of Texas at Austin, Austin, Texas 78712, U.S.A.*; V. E. Lukash. *I. V. Kurchatov Institute of Atomic Energy, Moscow, USSR.*

We describe an accurate and efficient model for studying the evolution of tokamak plasmas. The equilibrium problem for a plasma with a free boundary is solved using the "inverse variable" technique. The one-dimensional (averaged on magnetic surfaces) system of transport equations are solved, together with the circuit equations for the vacuum vessel and the passive and active coils. As an example of the application of this method, we simulate the discharge in the T-3M tokamak as it transiently evolves to a separatrix configuration.

THE GALERKIN–COLLOCATION METHOD FOR HYPERBOLIC INITIAL BOUNDARY VALUE PROBLEMS. P. Dutt and A. K. Singh. *Department of Mathematics, Indian Institute of Technology at Kanpur, 208016, India.*

In this paper we implement a spectral method for solving initial boundary value problems which is in between the Galerkin and collocation methods. In this method the partial differential equation and initial and boundary conditions are collocated at an overdetermined set of points and the approximate solution is chosen to be the least-squares solution to this system of equations. The solution is obtained using preconditioned residual minimization. Numerical results for linear and nonlinear hyperbolic problems are provided.

A PARALLEL ALGORITHM FOR FILTERING GRAVITATIONAL WAVES FROM COALESCING BINARIES. B. S. Sathyaprakash and S. V. Dhurandhar. *Inter-University Centre for Astronomy and Astrophysics, Post Bag 4, Ganeshkind, Pune, 411 007, India.*

Coalescing binary stars are perhaps the most promising sources for the observation of gravitational waves with laser interferometric gravity wave detectors. The waveform from these sources can be predicted with sufficient accuracy for matched filtering techniques to be applied. In this paper we present a parallel algorithm for detecting signals from coalescing compact binaries by the method of matched filtering. We also report the details of its implementation on a 256-node connection machine consisting of a network of transputers. The results of our analysis indicate that parallel processing is a promising approach to on-line analysis of data from gravitational wave detectors to filter out coalescing binary signals. The algorithm described is quite general in that the kernel of the algorithm is applicable to any set of matched filters.

ON A FINITE-ELEMENT METHOD FOR SOLVING THE THREE-DIMENSIONAL MAXWELL EQUATIONS. F. Assous, P. Degond, E. Heintze, P. A. Raviart, and J. Segre. *CEA-Centre d'Etude de Limeil-Valenton, BP 27, 94195 Villeneuve-Saint-Georges, Cedex, France.*

The aim of this paper is to present a method for solving the time-domain three-dimensional Maxwell equations, which can be coupled with a particle solver. For this purpose, Maxwell's equations are reformulated as a constrained wave equation system, with Lagrange multipliers associated to the conditions $\nabla \cdot B = 0$ and $\nabla \cdot E = \rho/\varepsilon_0$. We approximate both the fields and the Lagrange multipliers with a finite element method using a Taylor–Hood element.

A NEW FREE SURFACE MODEL FOR THE DIP COATING PROCESS. O. Réglat, R. Labrie, and P. A. Tanguy. *Department of Chemical Engineering, Université Laval, Québec, Canada G1K 7P4.*

A new iterative finite element solution methodology for free surface flow problems is presented. The approach is based on an explicit projection of the free surface conditions onto a moving boundary, which is iteratively updated using a combination of an adaptive nodal displacement scheme, a B-spline smoothing, and a remeshing of the flow domain. The methodology is tested successfully on the dip coating problem.

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