surface Laplacian is known. It is shown that in order to obtain accurate results, due care has to be taken of irregularities present in the triangulation grid. If this is done, the approximation will equal the performance of an expression based on least squares which can be derived. Next the different approximations obtained are used as a regularization operator in the solution of an ill-posed inverse problem in electrical volume conduction. It is shown that in this application a crude approximation to the surface Laplacian suffices.

A Dynamic Load Balancing Algorithm for Molecular Dynamics Simulation on Multi-Processor Systems. J. E. Boillat, *Institute of Informatics and Applied Mathematics, University of Bern, Bern, SWITZERLAND*; F. Bruge, *Department of Physics, University of Palermo, Palermo, ITALY*; P. G. Kropf, *Institute of Informatics and Applied Mathematics, University of Bern, Bern, SWITZERLAND.*

A new algorithm for dynamic load-balancing on multi-processor systems and its application to the molecular dynamics simulation of the spinodal phase separation are presented. The load-balancer is distributed among the processors and embedded in the application itself. Tests performed on a transputer network show that the load-balancer behaves almost ideally in this application. The same approach can be easily extended to different multi-processor topologies or applications.

Solvability Condition and Its Application to Fast Numerical Solution of Overposed Inverse Problems in Compressible Flows. Prabir Daripa, *Division of Applied Mathematics, Department of Mathematics, Texas A&M University, College Station, Texas, USA.*

In this paper we derive some results that give the existence of solutions (restricted by a compatibility condition) to overposed inverse design problems in a satisfactory manner. An overposed inverse design problem is concerned with generating a profile which will have a specified speed distribution $q_o^s(s)$ at a given free stream Mach number M_∞^s. This is equivalent to specifying pressure distribution. This problem has been of interest in aeronautical engineering. The overposedness of this problem is due to the specification of M_∞^s. An important issue has been the relation between $q_o^s(s)$ and M_∞^s. We derive this relation. A very useful approximation to this relation is established through numerical experiments which is exact for all practical purposes. We show the importance of this result in solving the overposed problem in an efficient manner.

Numerical Solution of Hamiltonian Systems in Reaction Diffusion by Symplectic Difference Schemes. A. R. Mitchell, B. A. Murray, and B. D. Sleeman, *Department of Mathematics and Computer Science, The University, Dundee, SCOTLAND.*

Discrete models in time and space of Fishers equation, $\partial u/\partial t = \partial^2 u/\partial x^2 + f(u)$, in reaction diffusion are numerous in mathematical biology. For $f(u) = u(1-u)$ and no dissipation, May, using the Euler discretisation of the time derivative, found stable solutions (period 2 in time) provided the time step satisfies $2 < k \leqslant \sqrt{6}$, the linearised stability for period 1 solutions being $0 < k \leqslant 2$. When the dissipation term in discretised form is added to May's ordinary difference scheme, it is shown by Griffiths and Mitchell and Sleeman that the stable period 2 in time solutions persist. Here it is shown that when the dissipation term in continuous form is added to May's difference equation, solutions period 2 in time for each value of x satisfy a Hamiltonian system in space. The latter, being non-integrable, is solved numerically by symplectic difference schemes constructed to maintain the values of the Hamiltonian energy up to large values of the space variable. The shape of the solution, in calculations involving 200,000 space steps, is shown to depend crucially on the type and location of the fixed points of the Hamiltonian system in phase space and the position of the initial data at $x = 0$ relative to these fixed points.