EFFICIENT INTEGRATION OF PROPAGATION EQUATIONS

Freeman Gilbert and George E. Backus

Inst. of Geophysics and Planetary Physics
University of California
San Diego, Calif.

There are many branches of geophysics where the concept of normal modes or waveguide modes proves useful. Usually one is led to problems involving the solution of systems of coupled linear ordinary differential equations, called propagator equations. Runge-Kutta methods of orders 1,...,M can be used efficiently to integrate the propagator equations. It is vital to have an estimate of the step size necessary to obtain a given truncation error. The largest eigenvalue of the coefficient matrix of the propagator equations can be used to find the optimum step size for each order of the Runge-Kutta methods. Numerical experiments indicate a threefold to fourfold improvement over more conventional methods.

****

COMPARISON OF THEORETICAL RAYLEIGH WAVES GENERATED BY ATMOSPHERIC EXPLOSIONS OVER AN OCEANIC AND A CONTINENTAL MODEL

David G. Harkrider

Brown University
Providence, R.I.

Edward A. Flinn
Earth Sciences, A Teledyne Co.
Alexandria, Va.

The matrix formulation for coupling an atmosphere-ocean system to the solid earth will be presented. This theory allows one to calculate the excitation of air and sea waves from subsurface sources and the excitation of Rayleigh waves from atmospheric and oceanic sources. As an example, theoretical Rayleigh waves are synthesized for two multilayered earth models, an oceanic and a continental structure. The sources are atmospheric explosions at various altitudes. A comparison is made of the fundamental and first higher mode as a function of source height and earth model below the source.