Geophysical Turbulence Program Seminar

National **C**enter for **A**tmospheric **R**esearch

SEL: A Fully-Implicit Parallel Spectral Element Fluid Simulation Code

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Abstract:

I will describe the 2D spectral element Fortran 95 code SEL. It uses high-order spectral elements to treat any system of equations in flux-source form. Specification of the physical equations is carefully separated from the methods of discretization and solution. The fully-implicit time step uses either a theta scheme, with theta=1/2 the time-centered Crank-Nicholson method; or BDF2.

The PETSc library is used for access to advanced parallel Krylov or direct solvers and various preconditioners. Static condensation is used as a preconditioner, eliminating high-order coefficients in terms of linear ones by small local direct solves which parallelize perfectly, to greatly reduce the size and condition number of the global, parallel systems to be solved. Harmonic grid generation is used to adapt the grid to local regions of rapid variation and align it with an evolving magnetic field. Results will be presented for two-fluid, resistive magnetic recombination.

When:

November 14, 2006

Tuesday, 2:30pm (Refreshments at 2:15pm)

Where:

Center Green Building 1

Room 2139 (Captain Mary)

The 2:03 shuttle from the Mesa Lab will arrive in time for the seminar.   Support sgentile@ucar.edu