SPATIAL DISCRETISATION – ISSUES

PSEUDO-SPECTRAL:

- Spectral parts of calculation limited to separable terms
  - Current fudge:
$$\frac{\gamma C_k}{\rho}\nabla^2 T \approx \frac{\gamma C_k}{\overline{\rho}}\nabla^2 T$$
  - If used full ρ, or term used a spatially-dependent coefficient
$$\nabla T \cdot \kappa(\rho, T : x, y, z, t)\nabla T$$
then this term cannot be treated in spectral space. Must be treated in configuration space explicitly. This then presents a stability problem. Give up spectral at this point!

FINITE-DIFFERENCES:

- Boundary conditions are computed at grid points.
  - May be more stable to compute between grid points.
- Meshes for all variables are concurrent.
  - Again, probably more stable to calculate on staggered meshes.
  - However, this requires averaging and interpolating processes which is a problem for variables in phase space.