SPATIAL DISCRETISATION

HYBRID PSEUDO-SPECTRAL/FINITE-DIFFERENCE SCHEME:

- Pseudo-spectral in horizontal directions
- Finite-difference in vertical direction

HORIZONTAL

- Periodic Fourier transforms satisfy the boundary conditions automatically
- Theoretically more accurate than any other approximation although at the limit of resolution this is questionable.
- Pseudo-spectral:
  - Do linear operations in phase (Fourier) space where derivatives are reduced to mere multiplications
  - Do non-linear operations in configuration (real) space to avoid convolution sums
  - Transformation between spaces by Fast Fourier Transforms (FFT's)
- Considerations:
  - Availability, portability, speed of FFT
  - Parallelisability of FFT
  - Pseudo-spectral algorithm uses memory and can introduce aliasing errors.

VERTICAL

- Centred finite-differences
- Considerations:
  - Can do any boundary conditions
  - Can stretch grids according to asymmetry of problem
  - More parallelisable