Geometrical adaptive methods for the semi-geostrophic equations of meteorology

Matthew D Piggott
mapmdp@maths.bath.ac.uk
Univeristy of Bath, U.K.

In this talk we consider the use of adaptive methods in the numerical solution of PDEs. We introduce a problem from meteorology — the semi-geostrophic equations. This is a problem which may be written in terms of an advection equation coupled with a Monge-Ampère equation describing a coordinate transformation. This is a challenging problem to consider numerically, for example the equations support the formation of discontinuities (atmospheric fronts).

We will demonstrate links between the Legendre coordinate transformations used to study the semi-geostrophic equations and numerical concepts of adaptivity based on moving meshes. In particular we show how geometrical ideas play a key role in the numerical analysis of the system.