

Matania Ben-Artzi

The Hebrew University of Jerusalem

Conservation laws on the sphere: From Shallow-Water to Burgers

One of the best known models for atmospheric flow is that of the "Shallow-Water" system (on the sphere). It is a complicated system of nonlinear hyperbolic equations, involving material discontinuities, shocks and other wave patterns. The first part of this talk is devoted to a Lagrangian derivation of the system.

In the second part a scalar conservation law is introduced. It is the "geometric" equivalent of the famous Burgers equation. The theory of existence and uniqueness is stated (uniqueness is implied by a suitable version of the entropy condition). The proofs (not discussed in detail in this talk) use a combination of dissipative estimates and Young measures. Some numerical results are presented, showing a very rich collection of steady-state solutions, solutions confined to designated domains and more.

(Joint work with J. Falcovitz and Ph. LeFloch).