Séminaire Vendredi 23 Novembre 10h00 / Seminar Friday November 23 10:00 AM

Conférencier/Lecturer: Daniel Y. Le Roux (Université Laval)

Sujet/Subject: Finite-element approximations of shallow-water models

Présentation/Presentation: Français / French

Lieu/Room: Grande salle du premier étage CMC

Résumé/Abstract:

In the first part a constructive linear algebra approach is developed to characterize the kernels of the finite element discretized shallow water equations. Three kernel relations are identified as necessary conditions for the discretized system to share the same stationary properties as the continuous system. The kernel concept is then used to characterize the smallest representable vortices. Both uniform and unstructured mesh situations are considered and compared. Issues such as decoupling of vortex modes are also examined. This study includes a number of classical finite element pairs and a variety of Raviart-Thomas and Brezzi-Douglas-Marini finite elements. In the second part a number of temporal procedures for solving the fast gravity and slow Rossby modes using the finite element method in space are presented and analyzed. The analysis determines the stability of the schemes and the error in wave amplitude and phase that can be expected.