Séminaire Vendredi 23 Novembre 11h00 / Seminar Friday November 23 11:00 AM

Conférencier/Lecturer: Majid Mohamadian

Sujet/Subject: Unstructured finite volume methods and horizontal flows with heat sources

Présentation/Presentation: Anglais / English

Lieu/Room: Grande salle du premier étage CMC

Résumé/Abstract:

We begin with the simulation of shallow flows over variable topographies which is a challenging case for most shock-capturing finite volume schemes. This problem arises because the source terms and flux gradients are not balanced in the numerical computations. We present efficient methods to treat the source terms which satisfy the compatibility condition on unstructured grids. The calculation of the bed slope source term is performed by employing a compatible approximation of water depth at the cell interfaces. Different components of the bed slope term are considered separately and a compatible discretization of the components is proposed.

In the second part, we discuss canonical balanced dynamic equations involving vertically sheared horizontal flows with heat or mass sources which emerge in multi-scale modeling of the equatorial wave guide on a wide range of spatio-temporal scales. The properties of solutions of these canonical balanced equations are studied thorough a combination of exact and numerical solutions and stability analysis for vertical vorticity amplification in a preconditioned environment is presented. Finally, we study elementary solutions for the evolution of radial eddies which represent hot towers in a suitable radial preconditioned environment.