Séminaire Jeudi 18 Juin 2009 14H00 / Seminar Thursday June 18th, 2009 14H00

Conférencier/Lecturer: Ramachandran Nair (NCAR)

Sujet/Subject: The Discontinuous Galerkin Methods for Atmospheric Numerical Modeling

Présentation/Presentation: Anglais / English

Lieu/Room: Salle de réunion du 2eme étage CMC, 14:00

Résumé/Abstract:

Recent paradigm shifts in large-scale high performance scientific computing have motivated investigations into "local" numerical methods that efficiently scale to tens of thousands of processors but still retain desirable properties for geophysical modeling. The discontinuous Galerkin (DG) method is a local and hybrid approach that combines a finite-volume method and a high-order finite-element method. Because of its properties such as conservation, scalability, high-order accuracy and the ability to adapt complex grid systems, the DG method is widely used for solving a variety of fluid-flow equations in computational science and engineering. These numerical properties are essential for building the next generation of atmospheric models, and the DG method is a promising candidate in this regard. The seminar focuses on the development of DG-based atmospheric models including as first step, a 3D hydrostatic (baroclinic) dynamical core on the cubed-sphere.

For the baroclinic model, the prognostic equations are cast in the flux-form, and are implemented in NCAR's High-Order Method Modeling Environment (HOMME) framework. The vertical discretization of the model relies on the Lagrangian method combined with a periodic conservative remapping. This approach treats the baroclinic model as a multi-layer shallow-water system and provides a conservative dynamical core in HOMME. Results with idealized test-cases and scaling studies in 2D and 3D will be presented.