MMM SEMINAR *NCAR*

Introducing libmpdata++ and libcloudph++ - Reusable Software for Atmospheric Modelling

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Two newly developed reusable software components applicable to atmospheric modelling will be introduced during the talk. The two projects named libmpdata++ and libcloudph++ are implemented as C++ libraries and are released as free and open-source software. Both are designed with maintainability, researchers productivity and result reproducibility as priorities.

The libmpdata++ is an implementation of a family of advective transport solvers based on the Multidimensional Positive Definite Advection Transport Algorithm (MPDATA). It covers the basic second-order-accurate formulation of MPDATA, its third-order variant, the infinite-gauge option for variable-sign fields, and a flux-corrected transport extension to guarantee non-oscillatory solutions. In the current release, the solvers offer integration in up to three spatial dimensions and parallelisation through domain decomposition using shared memory.

The second library - libcloudph++ - is a collection of algorithms for representing cloud microphysics in numerical models. It is intended for models of different dimensionality and complexity, ranging from simple zero-dimensional parcel frameworks to complex cloud-resolving (e.g. large-eddy) simulations. In the current release, the library covers three warm-rain schemes: a single-moment bulk scheme, a double-moment scheme and a particle-based scheme featuring the ``Super Droplet'' Monte-Carlo coalescence algorithm. The particle-based scheme is implemented for execution on both CPU[s] and GPU.

Simulations of aerosol-cloud interactions performed using a model based on libmpdata++ and libcloudph++ will be presented.

This seminar will be recorded and available via webcast at:
http://www.fin.ucar.edu/it/mms/fl-live.htm

Thursday, 4 September 2014, 3:30 PM
Refreshments 3:15 PM
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