

Project 1: Getting familiar with FORTRAN

FORTRAN Program Instructions

A. Introduction

A sample program, *cm1_terrain.f90*, is designed to help you get familiar with how to compile, link, and run FORTRAN programs and plot its results using GrADS. You can download *cm1_terrain.f90* from the MesoLab website (<http://mesolab.ncat.edu> => NWP => Project 0 => *cm1_terrain.f90*). The GrADS program will also be used for plotting results after running *advec1.f* in Project 1.

You should get yourself familiar with *cm1_terrain.f90* before working on Project 1. You may also want to practice to make movie of the animation by using Windows Movie Maker.

Program *cm1_terrain.f90* is a sample FORTRAN program which essentially computes the discretized values, $f(x_i, y_j)$, to approximate the continuous values of the real-valued function $f(x, y)$, of the independent variables, x and y , over a computational grid whose spatial interval is specified to be Δx and Δy . This particular function will allow you to get familiar with certain graphics software, which can plot one-dimensional curves and contour two-dimensional fields. You will see both types of figures throughout the course, and so you will need to get an early start in understanding the basics of simple plotting routines.

To compile and link the FORTRAN program *cm1_terrain.f90*, at the prompt type:

```
% cd sample  
% gfortran -o sample.exe cm1_terrain.f90
```

This command will invoke the FORTRAN compiler on your local system and create the executable file *sample.exe* in your directory. To run the program, at the prompt type:

```
% ./sample.exe
```

The program will create two output files of form *perts.##*. These will be used with the software plotting packages.

B. GrADS and *sample.exe* output

The file *perts.dat* contains output in a GrADS-readable format. When *sample.exe* was run, an additional file *pertsctl* was created. This GrADS control file is needed for plotting output in GrADS. To view the output of *sample.exe* interactively using GrADS, first type the following:

```
% grads -l
```

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NC A&T State University
Dr. Yuh-Lang Lin (ylin@ncat.edu)

A new window should appear, and the prompt `ga->` should appear in the terminal window. Make sure that no terminal window obscures this new window when running GrADS. Next, open a GrADS control file and display the contained field.

For the 2-D field, enter:

```
ga-> open perts.ctl
ga-> d height
ga-> close 1
```

Type 'quit' when finished viewing GrADS plots.

Other Useful Information and Online Documentation

Students should also become familiar with basic UNIX or Linux commands, editors, along with GrADS package. You may find the following online documentation useful.

(a) *On-line Tutorials on Computer Systems*

<http://www.eng.hawaii.edu/Tutor/intro.html>

(b) *Commonly Used UNIX Commands*

http://www.nmt.edu/tcc/help/unix/unix_cmd.html

(c) *Editor 'vi'*

<http://www.eng.hawaii.edu/Tutor/vi.html>

(d) *Editor 'Xedit'*

Straightforward. Also, try <http://www.rexswain.com/xedit.html>

(e) *GrADS documentation (very useful!)*

<http://grads.iges.org/grads/gadoc>