Changes to ENDGame setup

July 31, 2012

- Parameters were not passed into namelist. Now fixed.
- New parameters added for runtime control of physics dynamics coupling and optional testcase description flag

1 Physics/Dynamics coupling flags[1]

In the default setting the physics parameterisations are called with time-level n prognostics. This is for most models the only option. With ENDGame being an iterative dynamical core a few more options exist. Assume that the solution step can be written (crudely) as

$$\frac{D\phi}{Dt} = \int_a^d D\mathrm{d}s + \int_a^d P\mathrm{d}s.$$

With ϕ, D and P denoting a prognostic, its source terms due to dynamics and due to physics, respectively. This is then implemented (roughly - with focus on physics) as

$$\phi^{n+1} = \phi_d^n + \Delta t \int_a^d D\mathrm{d}s + \Delta t \left((1-\alpha) P_d^n + \alpha P^{(n+1)} \right).$$

This can then be expanded further by splitting P into "slow" and "fast" contributions. In the current implementation of ENDGame (as it will be run in the UM) the α associated with the slow terms is 0 and the α associated with fast terms is 1 leading to:

$$\phi^{n+1} = \phi_d^n + \Delta t \int_a^d D\mathrm{d}s + \Delta t \left(S_d^n + F^{(n+1)} \right)$$

and large scale condensation contributing to S and the boundary layer to F. In summary:

- l_dcmip_phys2=.FALSE.,l_dcmip_phys2_offc=.FALSE.:
  $\phi^{n+1} = \phi_d^n + \Delta t \int_a^d D\mathrm{d}s + \Delta t P_d^n$
- l_dcmip_phys2=.TRUE.,l_dcmip_phys2_offc=.FALSE.:
  $\phi^{n+1} = \phi_d^n + \Delta t \int_a^d D\mathrm{d}s + \Delta t \left(S_d^n + F^{(n+1)} \right)$
- l_dcmip_phys2=.TRUE.,l_dcmip_phys2_offc=.TRUE.:
  $\phi^{n+1} = \phi_d^n + \Delta t \int_a^d D\mathrm{d}s + \Delta t \left((1-\alpha) P_d^n + \alpha P^{(n+1)} \right)$

2 Description flag

As described in the problem descriptions handout we can add a string to the filename to indicate special runs, with special settings (such as the PD coupling setting above, for example). Such a string can be specified in the dump_lookup file. Note that no spaces are allowed and the character limit is 20.

[1] In the following a refers to arrival point, d to departure point, n to time level n, $n+1$ to timelevel n+1, $(n+1)$ to the latest available predictor for timelevel n+1 and s to the trajectory. The trapezoidal rule of integration would be equivalent to a choice of $\alpha = 0.5$. In general D and P are functions of ϕ, x and t.

3 Additional notes

- the output will occur at the minimum frequency chosen for all fields, i.e. when one variable is set to every 5 timesteps and another to every 7, both will be output every 5 timesteps.
- The variable names have now been changed in the netcdf file to comply with DCMIP conventions. We have to test example output today.
- Remember to not only change the decomposition in x (E-W) and y (N-S) but to also edit the number of CPU's requested.
- the queue should now always be workshop, not shared.
- there are two very useful files in your run directory:
  - wmax.dat a file containing the time-series of maximum vertical velocity in the run
  - eg_job.info a file summarising the configuration of your run
- use one directory per run, otherwise you will overwrite files