Invitation to Participate in the CIG Community Dynamo Benchmark

Dear Colleagues,

On behalf of the dynamo working group of the Computational Infrastructure for Geodynamics (CIG), we invite you to participate in a coupled accuracy and performance benchmark exercise for numerical dynamos. Our objective is to assess numerical MHD codes used for simulating the geodynamo, by obtaining accuracy and performance statistics on standard, Boussinesq benchmark test problems using the XSEDE Stampede massively parallel computational platform. We will be very pleased if you would contribute to this community benchmark activity.

Benefits to you from participating include CIG support in porting and optimizing your code on Stampede, access to the CIG Dynamo Group XSEDE computing allocation, invitation to the next CIG Community Dynamo Development Workshop (to be scheduled in Spring 2014), and participation in a special issue of GAFD devoted to workshop and benchmark contributions.

The accuracy tests involve solutions to two known dynamo benchmark cases. The first accuracy test is Case 1 of the first numerical dynamo benchmark initiative by Christensen et al., *PEPI* (2001), which makes use of insulating magnetic boundary conditions. The second accuracy test will be the pseudo-vacuum case carried out in Jackson et al. *GJI* (2013), which is well suited for testing models that make use of local methods. Both these cases will be run on Stampede for purposes of determining accuracy.

For the performance benchmark tests, CIG Developers Matsui and Heien will carry out an extensive suite of calculations to test each dynamo code's computational performance on Stampede. Using the same parameters as in the accuracy benchmark cases, but higher spatial resolutions, these tests will investigate strong and weak parallelization efficiency of all the participating codes.

Details of the benchmark exercise have been posted at

http://geodynamics.org/cig/community/workinggroups/geodyn/benchmark/geodynamo_benchmark/at_download/file

on the CIG Dynamo Benchmark webpage

http://geodynamics.org/cig/community/workinggroups/geodyn/benchmark/

There are two ways to let us know of your willingness to participate. First, you can simply email a tar file of your code to CIG developers Hiroaki Matsui (hrmatsui@ucdavis.edu) or Eric Heien (emheien@ucdavis.edu). They will install your code on Stampede and then get in contact with you so you can begin the benchmarking process. If you cannot email your code but want to participate, please contact Jon Aurnou (aurnou@ucla.edu) to arrange alternative ways to participate.

In order to present our first results at this fall's AGU meeting, the deadline for reporting the accuracy benchmark solutions is November 1st, 2013.

We believe that success of this activity will greatly accelerate research on planetary and other natural dynamo systems. Your help is vital, and we thank you in advance for participating.

Sincerely,

Peter Olson
(on behalf of the CIG Dynamo Working Group)