

**International Workshop on  
Modelling Reactive Transport in Porous Media  
Strasbourg (France),  
January 21-24, 2008**

**Benchmark participation: deadline march,31 2008**

Report

**Special Issue on computer and geosciences: deadline march,31 2008**

Application articles using the journal format.

Benchmark

One article describing the code using the journal format. Do not include the imposed figures. One or two other specific results can be shown. These articles could include comparisons of simulation results as a function of discretization (space and time) and a discussion of the code features, strengths and weaknesses by the authors.

A synthesis article that compares the results of all codes. We need imposed figure and CPU time table. Authors submitting an article on the benchmark have to send the imposed figures and the CPU time table.

**Criteria for benchmark results comparison**

Participant should present a free format report. Some elements are imposed and must be included in this report. Participant can include other additional elements.

**Imposed elements:**

All the imposed figures (see “imposed figures file”). You can include plotted figures into the report but please send them as separated file under the ascii format (see § imposed figures)

A table with the normalized CPU time for all the presented results.

In order the help on results comparison, we propose to present all the imposed figures using two forms:

Free CPU: no constraints are imposed on mesh size or time step.

Fixed CPU: instead of imposing a mesh size or/and a time step (not realistic because of the various methods used), we propose to solve the problem with

approximately the same normalised CPU time. This imposed CPU time must be respected within a tolerance of +/- 10 %.

For easy 1D adv : CPU = 3500

Easy 1D diff : CPU = 2000

Easy 2D adv : CPU = 10 000

Easy 2D diff: CPU = 10 000

For medium 1D adv : CPU = 500

Medium 1D diff : CPU = 500

Medium 2D adv : CPU = 7 000

Medium 2D diff: CPU = 7 000

For hard 1D adv : CPU = 5000

Hard 1D diff : CPU = 5000

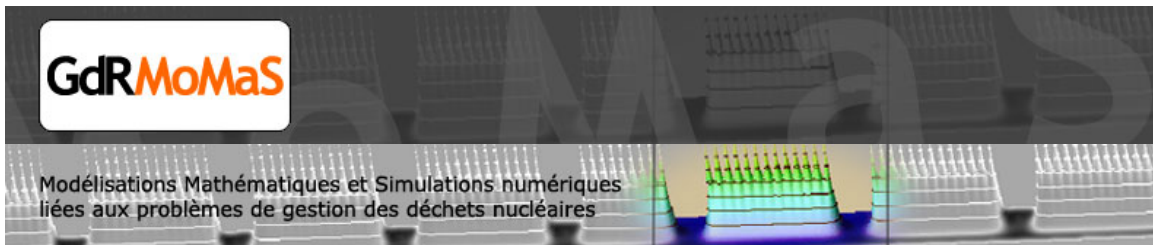
Hard 2D adv : CPU = 20 000

Hard 2D diff: CPU = 20 000

### **Criteria for evaluation**

The criteria are classified by importance rank:

- 1) Comparison of the results presented on prescribed figures.
- 2) Comparison (with care) of CPU times.
- 3) Presentation of the code, numerical methods, justifications ..; Study of the "convergence rate" of the codes: how many mesh or time step refinement is needed to obtain a "reference solution". CPU time for each refinement can give some important indications.



### Imposed figures

Please send ascii files named "Figure1a-Author name.dat". Figures named "a" are for fixed CPU, figures named "b" are for free CPU. Column should be separated by ";" and numbers should be 1.23d-3 or 1.235e-35. Number of decimal is free. Please don't put any title to the columns or any indication in the file. It should only contain numerical values. Depending on the figure, column should be ordered as follow.

For time plots:

Time ; concentration

For space plots:

Space ; concentration

For 2D maps:

Space x ; space y ; concentration

### Easy level

Easy 1D advective:

Figure 1: S concentration at time 10; space from 0 to 2.1

(a) imposed CPU; (b) free CPU

Easy 1D diffusive:

Figure 2: C2 concentration at  $x = 2.1$ ; time from 0 to 6000

(a) imposed CPU; (b) free CPU

Easy 2D advective:

Figure 3: TD3 concentration at  $x = 2.1$  and  $y = 0.3$  (center of the outflow zone); time from 0 to 6000

(a) imposed CPU; (b) free CPU

Figure 4: X3 concentration map at  $t = 1000$ ;  $x$  from 0 to 2.1 and  $y$  from 0 to 1.

(a) imposed CPU; (b) free CPU

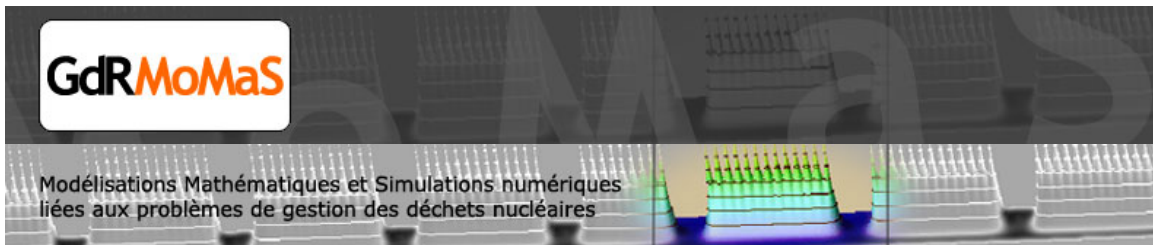
Easy 2D diffusive:

Figure 5: C5 concentration at  $x = 2.1$  and  $y = 0.3$  (center of the outflow zone); time from 0 to 6000

(a) imposed CPU; (b) free CPU

Figure 6: S concentration map at  $t = 10$ ;  $x$  from 0 to 2.1 and  $y$  from 0 to 1.

(a) imposed CPU; (b) free CPU



### Medium level

Medium 1D advective:

Figure 7: C5 concentration at  $x = 2.1$ ; time from 0 to 6000  
(a) imposed CPU; (b) free CPU

Medium 1D diffusive:

Figure 8: C6 concentration at  $x = 2.1$ ; time from 0 to 6000  
(a) imposed CPU; (b) free CPU

Figure 9: S concentration at  $x = 2.1$ ; time from 0 to 6000  
(a) imposed CPU; (b) free CPU

Medium 2D advective:

Figure 10: X2 concentration at  $x = 2.1$  and  $y = 0.3$  (center of the outflow zone); time from 0 to 6000  
(a) imposed CPU; (b) free CPU

Figure 11: X2 concentration map at  $t = 1000$ ;  $x$  from 0 to 2.1 and  $y$  from 0 to 1.  
(a) imposed CPU; (b) free CPU

Medium 2D diffusive:

Figure 12: C7 concentration at  $x = 2.1$  and  $y = 0.3$  (center of the outflow zone); time from 0 to 6000  
(a) imposed CPU; (b) free CPU

### Hard level

Hard 1D advective:

Figure 13: CP1 concentration at  $t = 2000$ ; space from 0 to 2.1  
(a) imposed CPU; (b) free CPU

Figure 14: CP2 concentration at  $t = 2000$ ; space from 0 to 2.1  
(a) imposed CPU; (b) free CPU

Figure 15: X2 concentration at  $x = 2.1$ ; time from 0 to 6000  
(a) imposed CPU; (b) free CPU

Hard 1D diffusive:

Figure 16: CP1 concentration at  $t = 1000$ ; space from 0 to 2.1  
(a) imposed CPU; (b) free CPU

Figure 17: CP2 concentration at  $t = 1000$ ; space from 0 to 2.1  
(a) imposed CPU; (b) free CPU

Figure 18: X2 concentration at  $x = 2.1$ ; time from 0 to 6000  
(a) imposed CPU; (b) free CPU

Hard 2D advective:

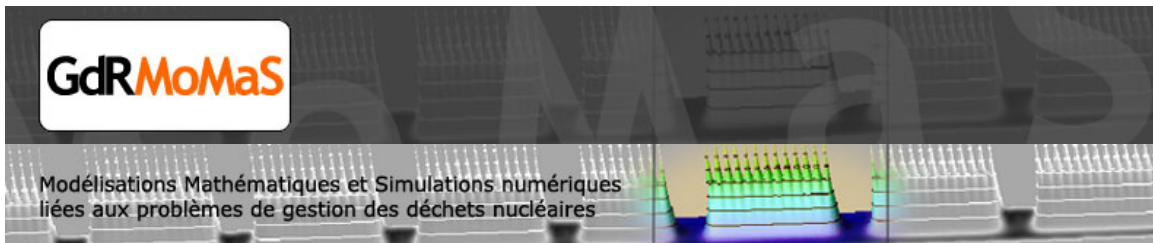


Figure 19: X2 concentration at  $x = 2.1$  and  $y = 0.3$  (center of the outflow zone); time from 0 to 6000

(a) imposed CPU; (b) free CPU

Figure 20: CP1 concentration map at  $t = 2000$ ;  $x$  from 0 to 2.1 and  $y$  from 0 to 1.

(a) imposed CPU; (b) free CPU

Figure 21: CP2 concentration map at  $t = 2000$ ;  $x$  from 0 to 2.1 and  $y$  from 0 to 1.

(a) imposed CPU; (b) free CPU

Hard 2D diffusive:

Figure 22: X2 concentration at  $x = 2.1$  and  $y = 0.3$  (center of the outflow zone); time from 0 to 6000

(a) imposed CPU; (b) free CPU

Figure 23: CP1 concentration map at  $t = 1000$ ;  $x$  from 0 to 2.1 and  $y$  from 0 to 1.

(a) imposed CPU; (b) free CPU

Figure 24: CP2 concentration map at  $t = 1000$ ;  $x$  from 0 to 2.1 and  $y$  from 0 to 1.

(a) imposed CPU; (b) free CPU