

## TEMPLATE FOR NUMERICAL EXPERIMENTS

2008 Analogue – Numerical model comparisons ([www.geodynamics.no/benchmarks](http://www.geodynamics.no/benchmarks))

For a quantitative comparison of all experiments it is extremely important that documentation of every experiment is provided in numbers and figures. Please observe the following:

- The size of the figures should be such that 20 cm is plotted at 12 cm exactly for experiment 1A, and 35 cm (real size of sand domain in experiments 1B and 2) is plotted at 12 cm exactly for 1B and 2. Resolution around 150-200 dpi.
- All values (e.g. shortening, viscosity, energies etc) should be scaled to cm-scale.
- Images should be in jpg with compression kept at a minimum.
- All figures should have a scale and an indication of the stage of shortening.
- Animations should preferably be in gif, but mpeg or quicktime is accepted too (please specify pc or mac).
- Please indicate a scale and the stage of shortening in every frame of the animation.
- Figures and animations should show the mobile wall at the right-hand side, moving from right to left.
- For strain-rate and pressure plots please use the scale bars from the experiment description (Fig. 7) repeated below.
- Please use file names that reflect the content, including name of code, experiment number and stage of shortening.



Scales (colour and magnitude) for strain-rate and pressure plots. The values are for the cm-scale.

Questions or comments? Please contact Susanne Buitter, [susanne.buitter\(at\)ngu.no](mailto:susanne.buitter(at)ngu.no)

**DESCRIPTION OF CODE – TABLE 1**

Name of code	
Numerical technique (FE, FD, DEM etc)	
Equations that are solved, including constitutive laws	
Special features of the code	

## EXPERIMENT 1A - TABLE 2

If experiments are calculated for different resolutions, please give all measurements in Tables 2 and 3 for your optimum resolution and (at least) points (9) – (12) in Table 3 for other resolutions. Please repeat Tables 2 and 3 for variations in dilation and/or elasticity (using your optimum resolution). For this experiment, variations in resolution and material properties are encouraged, but not required. Numbers in (brackets) refer to the experiment description and are a verification that the correct values were used.

Name of code	
Name(s) of modeller(s)	
2D or 3D	
Dimensions of experiment (length x width parallel to mobile wall x height)	
Scaled? If yes, give equivalent of 1 cm	
Quartz sand: Density (should be $1560 \text{ kg m}^{-3}$ ) Angle of internal friction ( $36^\circ - 31^\circ$ ) Cohesion (30 Pa) Boundary angle of friction ( $16^\circ - 14^\circ$ )	
Dilation	
Viscosity (background value) ( $10^{12} \text{ Pa}$ )	
Young's modulus, Poisson's ratio	
Time step (3.6 s)	
Velocity ( $2.5 \text{ cm h}^{-1}$ )	
Number of solution nodes in wedge, element type and horizontal x vertical elements (if applicable)	
Artificial air layer or not? If yes, density and viscosity of air layer	
Smoothened velocity discontinuity at lower-right corner? If yes, vertical distance and number of nodes over which smoothing is applied	
(2) File name of cross section animation	
If 3D, location of cross section in middle of the domain, measured relative to the front side (measured along mobile wall, with mobile wall to the right)	
(5) For 3D, file name of surface view animation	



## EXPERIMENT 1B - TABLE 4

**Repeat the experiment for 3 to 5 increasing resolutions.** For your optimum resolution, give all measurements. For the other resolutions, give (1) and (9) – (12) in Table 5 (please copy the table).

Please repeat Tables 4 and 5 for variations in dilation and elasticity, using your optimum resolution experiment. Numbers in (brackets) refer to the experiment description and are a verification that the correct values were used.

Name of code	
Name(s) of modeller(s)	
2D or 3D	
Dimensions of experiment (length x width parallel to mobile wall x height)	
Scaled? If yes, give equivalent of 1 cm	
Quartz sand: Density (should be $1560 \text{ kg m}^{-3}$ ) Angle of internal friction ( $36^\circ$ - $31^\circ$ ) Cohesion (30 Pa) Boundary angle of friction ( $16^\circ$ - $14^\circ$ )	
Corundum sand: Density (should be $1890 \text{ kg m}^{-3}$ ) Angle of internal friction ( $36^\circ$ - $31^\circ$ ) Cohesion (30 Pa) Boundary angle of friction ( $24^\circ$ - $23^\circ$ )	
Dilation	
Viscosity (background value) ( $10^{12}$ Pa)	
Young's modulus, Poisson's ratio	
Time step (3.6 s)	
Velocity ( $2.5 \text{ cm h}^{-1}$ )	
Smoothened velocity discontinuity at lower-right corner? If yes, vertical distance (should be 2 mm) and number of nodes in smoothing interval	
3D: location of cross section in the middle, measured relative to the front side (along mobile wall, with mobile wall to the right)	
3D (7): File names of cross sections at 10 cm of shortening at: a) 25% of along-strike width b) 50% minus 2 cm of along-strike width c) 50% of along-strike width d) 50% plus 2 cm of along-strike width e) 75% of along-strike width f) surface view with exact location of the 5 cross-sections	





## EXPERIMENT 2 - TABLE 6

**Repeat the experiment for 3 to 5 increasing resolutions.** For your optimum resolution, give all measurements. For the other resolutions, give (1) and (9) – (12) in Table 7 (please copy the table).

Please repeat Tables 6 and 7 for variations in dilation and elasticity, using your optimum resolution experiment. Numbers in (brackets) refer to the experiment description and are a verification that the correct values were used.

Name of code	
Name(s) of modeller(s)	
2D or 3D	
Dimensions of experiment (length x width parallel to mobile wall x height)	
Scaled? If yes, give equivalent of 1 cm	
Quartz sand: Density (should be $1560 \text{ kg m}^{-3}$ ) Angle of internal friction ( $36^\circ$ - $31^\circ$ ) Cohesion (30 Pa) Boundary angle of friction ( $16^\circ$ - $14^\circ$ )	
Corundum sand: Density (should be $1890 \text{ kg m}^{-3}$ ) Angle of internal friction ( $36^\circ$ - $31^\circ$ ) Cohesion (30 Pa) Boundary angle of friction ( $24^\circ$ - $23^\circ$ )	
Dilation	
Viscosity (background value) ( $10^{12}$ Pa)	
Young's modulus, Poisson's ratio	
Time step (3.6 s)	
Velocity ( $2.5 \text{ cm h}^{-1}$ )	
Smoothened velocity discontinuity at lower-right corner? If yes, vertical distance (should be 2 mm) and number of nodes in smoothing interval	
3D: location of cross section in the middle, measured relative to the front side (along mobile wall, with mobile wall to the right)	
3D (7): File names of cross sections at 10 cm of shortening at: a) 25% of along-strike width b) 50% minus 2 cm of along-strike width c) 50% of along-strike width d) 50% plus 2 cm of along-strike width e) 75% of along-strike width f) surface view with exact location of the 5 cross-sections	



