

# Plasticity Models

This repository contains supplementary [TerraFERMA](#) model files to accompany the paper

Spiegelman, M, David May and Cian R Wilson, *On the solvability of incompressible viscoplastic rheologies in geodynamics*, GCubed, 2016

## Contents

This repo contains the directories

- **solver\_strategies:** Directories containing input files for describing and running three different models and producing Figures 2,3,5 and 7 in the paper
  - **successive\_substitution:** Picard iteration/Approximate Newton methods (Figure 2)
  - **newton-convergence:** (Figure 3)
  - **newton:** Hybrid Picard-Newton schemes (Figure 5 and data for Figure 6)
  - **alpha-continuation:** Newton with continuation in the  $\alpha$  parameter (Figure 7 and data for Figure 8)
- **one\_layer:** A simplified version of this problem with just a single visco-plastic layer and a free-stress bottom. Just includes hybrid Newton-Picard schemes.
- **meshes:** gmsh input files and Dofin Meshes used in the models
- **paraview:** Paraview State files for assisting visualization of model results

## Running the Models

- **Install TerraFERMA:** To view and run these models you will need to build and install the open source code [TerraFERMA](#) (which can take some time, but is currently [supported](#) on most flavors of linux and Mac OSX). Detailed instructions can be found on the [Wiki](#). We suggest using our [Dorsal Scripts](#) for installation.
- **Running Models:** Once the software is installed models can be run from within each subdirectory using

```
$ tfsimulationharness --test <filename>.shml
```

where `<filename>.shml` is the name of the *simulation harness* file that controls parameter sweeps, organizes multiple runs, collects data and produces PDF plots of the results. The actual models are described in the *TerraFERMA* markup language files with suffix `.tfml`.

- **Viewing Input files:** both `.tfml` and `.shml` files can be viewed and manipulated using the [SPuD](#) gui `diamond` i.e

```
$ diamond <filename>.tfml
```

## Questions and Comments

Please address any questions or comments through the [issue tracker](#)