# Mag - Tutorial 2 - Reversal Dynamo Case

## Tutorial 2: Reversal Dynamo Case

In this example, we produce a magnetic field reversal using MAG. The input parameter in the source directory for this case is ~/src/par.Rev. There is no longitudinal symmetry in this case, so when you compile MAG, use param32s1.f linking to param.f. The Ekman number is E=0.02, the Prandtl number is Pr=1 and the magnetic Prandtl number is Pm=10. The Rayleigh number is Ra=12000.

Link param32s1.f to param.f:

```
$ ln -sf param32s1.f  param.f
```

Compile the program with:

```
$ make
$ mv magx magx32s4
```

Background execute using par.Rev as the input file and p.rev as the output file (Note: The output file's extension is specified in the par-file, e.g., here par.Rev specifies that the outfile should be named *filename*.rev):

```
$ magx32s4 <par.Rev >p.rev &
```

MAG will then execute and produce datafiles in the same directory. See Appendix B in the MAG User Manual for details on MAG's output files.

### Results and Discussion

This case has run on 32-bit and 64-bit Intel processors. Figure 1 below shows a plot of mean velocity Vrms, mean magnetic field Brms, the axial dipole and the dipole tilt on the outer boundary. It indicated a magnetic field reversal between time steps 25 and 30.

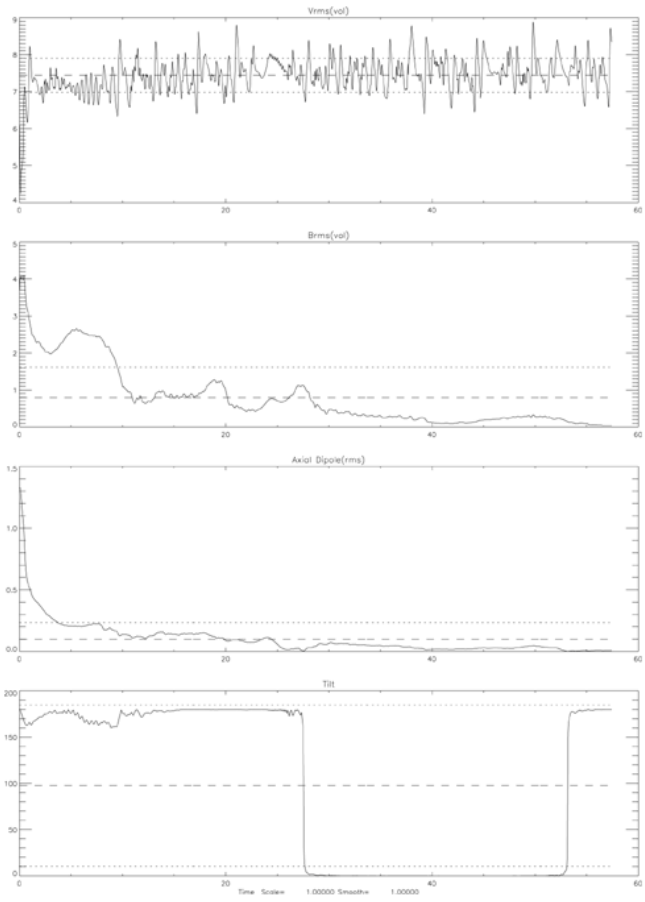


**Figure 1**

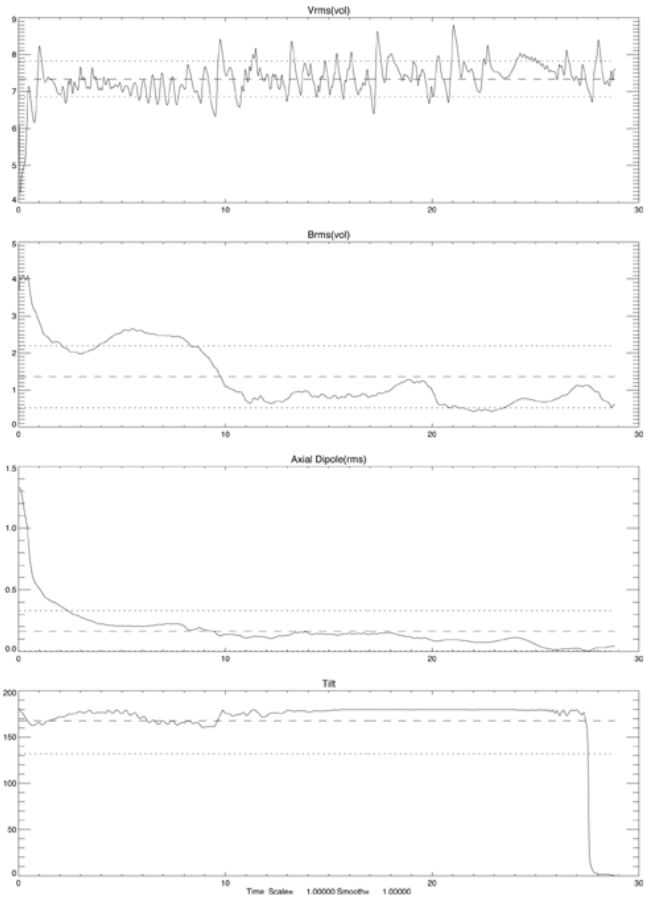


**Figure 2**

Figure 2 shows a longer run of MAG, where we see the magnetic field reversed again. At this time, the magnetic field had weakened substantially.

In Figures 3 and 4 (below), the top figure is the pole plot before the second field reversal and the bottom is the pole plot after the second field reversal.

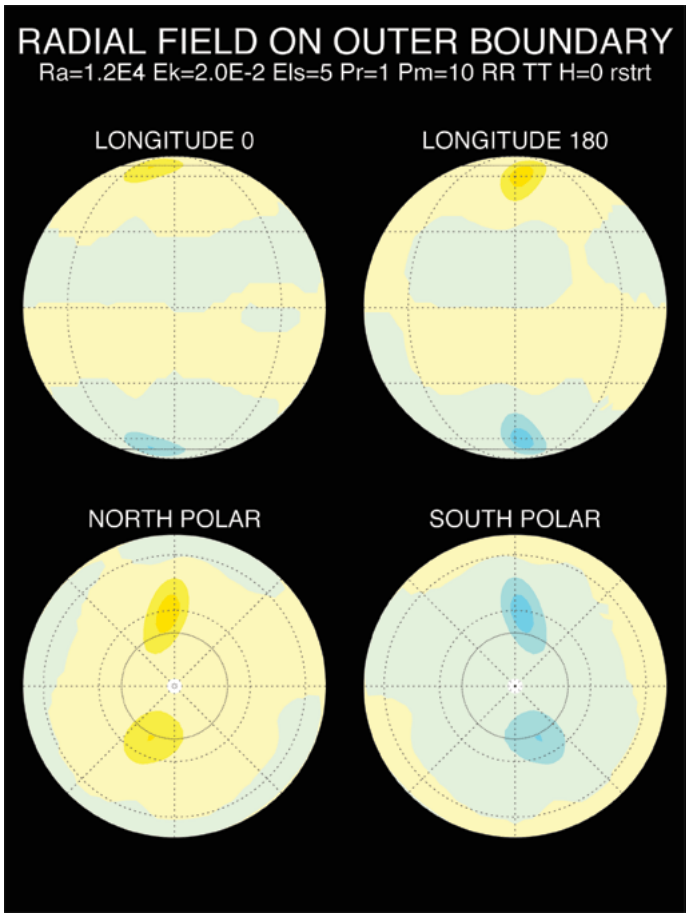


Figure 3

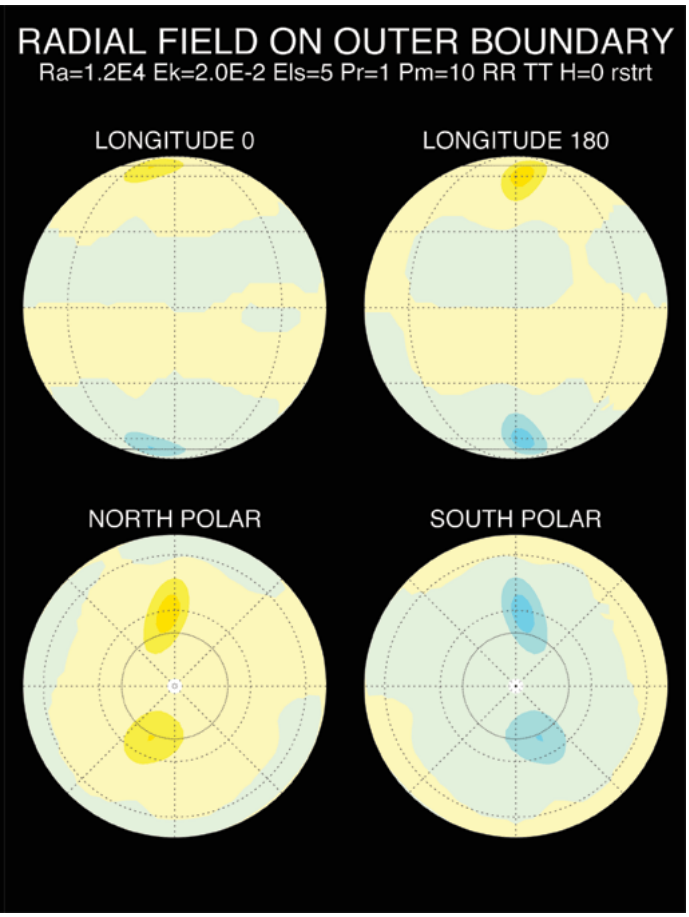


Figure 4

An additional tutorial on creating a Reversal Dynamo movie is found in Chapter 5 of the MAG User Manual.