

Supplementary material: Visualisations of purely poloidal and toroidal-poloidal steady-state regimes

Purely poloidal steady-state regime

Fig. 1 shows visualisations of the purely poloidal steady-state regime close to the onset of convection. This regime is dominated by the S_1^0 onset mode.

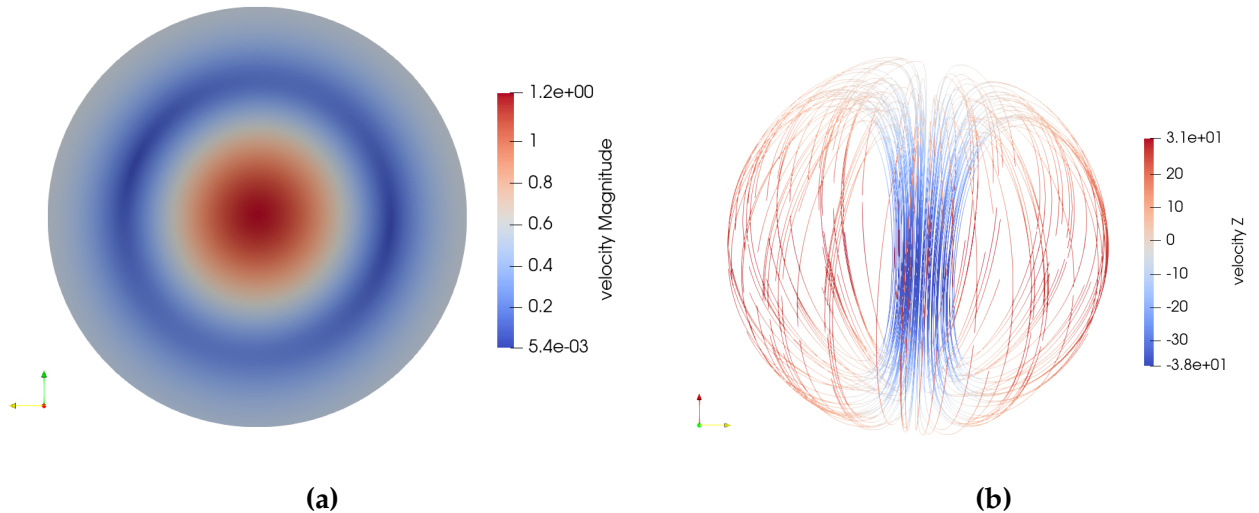


Figure 1: (a) Snapshot of the magnitude of velocity on an equatorial slice, and (b) a meridional view of velocity stream lines with colour scale corresponding to u_z at $Ra = 3122 \approx 1.01Ra_c$, $Pr = 1$. The boundary conditions are fixed temperature and stress-free. The red arrow of the coordinate system points in the direction of e_z .

Toroidal-poloidal steady-state regime

Fig. 2 shows visualisations of the toroidal-poloidal steady-state regime at $Ra = 3 \times 10^4 \approx 9Ra_c$, $Pr = 1$, just above the onset of toroidal flow.

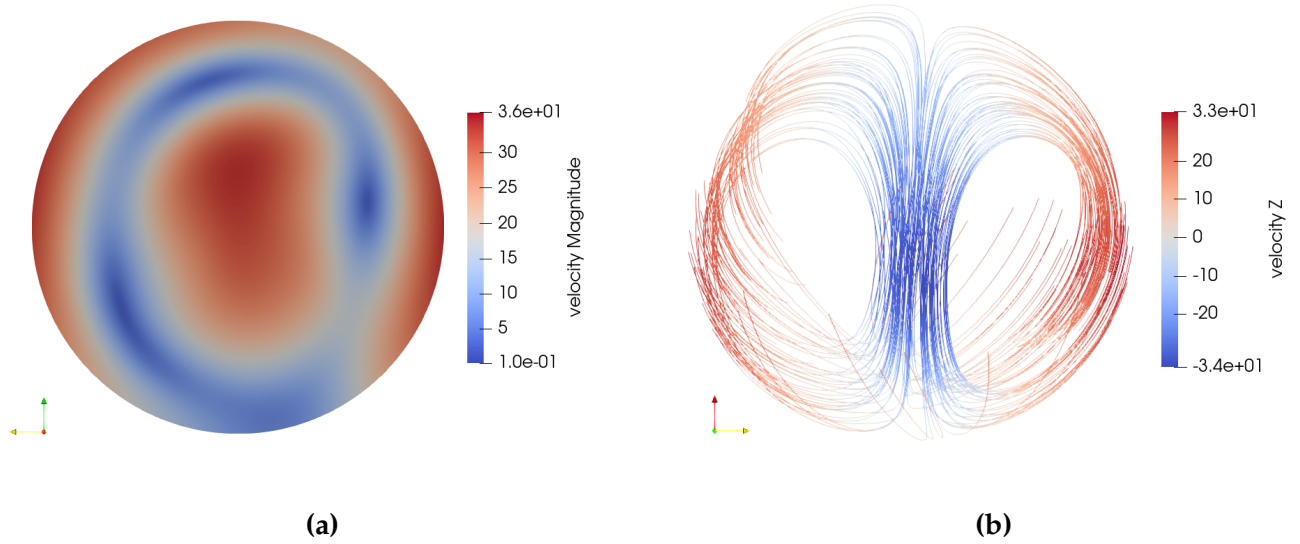


Figure 2: (a) Snapshot of the magnitude of velocity on an equatorial slice, and (b) a meridional view of velocity stream lines with colour scale corresponding to u_z at $Ra = 3 \times 10^4 \approx 9Ra_c$, $Pr = 1$. The boundary conditions are fixed temperature and stress-free. The red arrow of the coordinate system points in the direction of e_z .