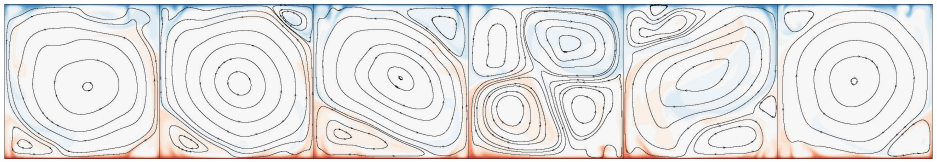
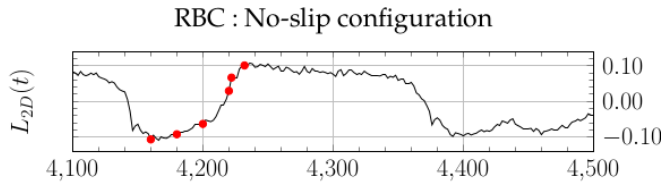
Effect of mechanical boundary conditions on the flow reversal in square Rayleigh-Bénard cells





Context

- Square Rayleigh-Bénard cell
- Intermittent reversal regime : flow structure breaks and re-organizes itself

Objectives

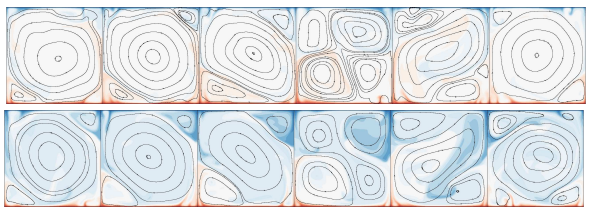
- Direct numerical simulations (Basilisk)
- Different top boundary conditions : No-slip (RBC) and Free-slip (RBS)
- Flow dynamics and Energetics of a flow reversal

A similar reversal mechanism

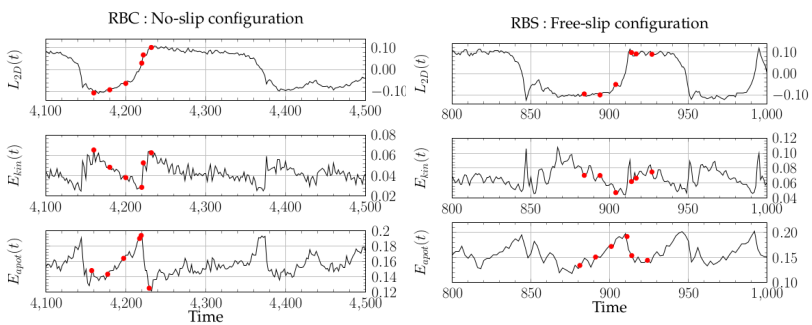
Time evolution of temperature field

RBC

RBS

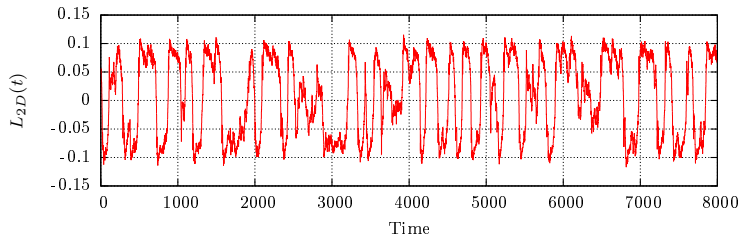


Time evolution of global quantities : angular impulse, kinetic energy, available potential energy

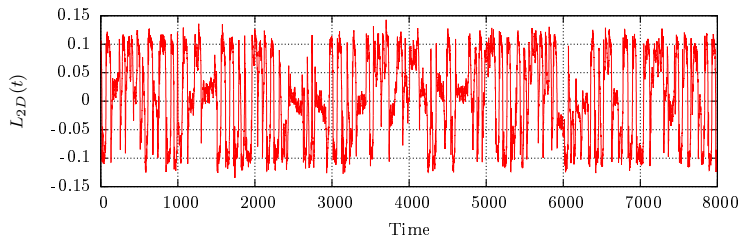


Reversals are **faster** and **more frequent** for RBS (free-slip BC) than RBC (no-slip BC)

RBC



RBS



Time series of angular impulse