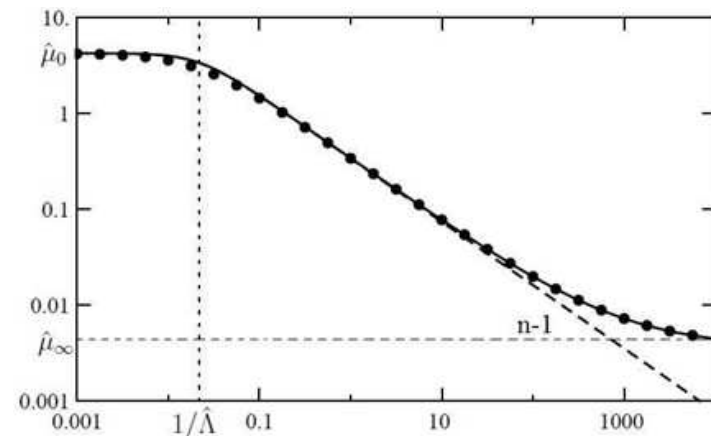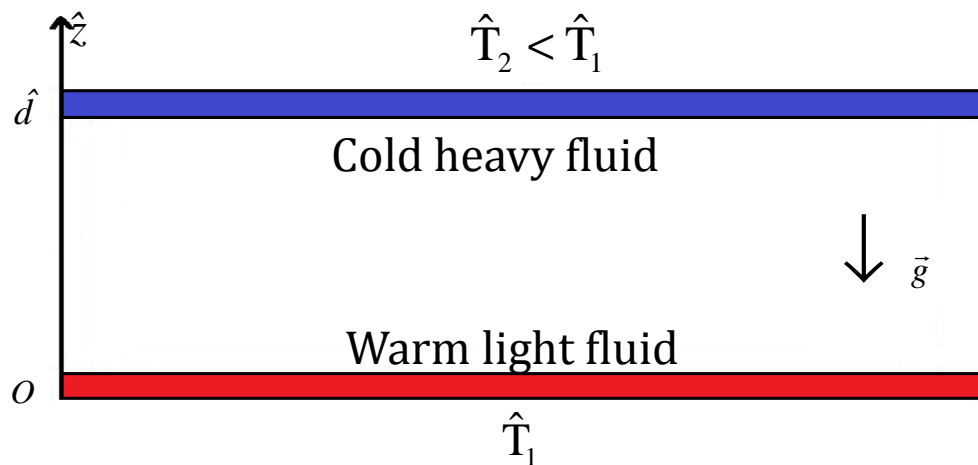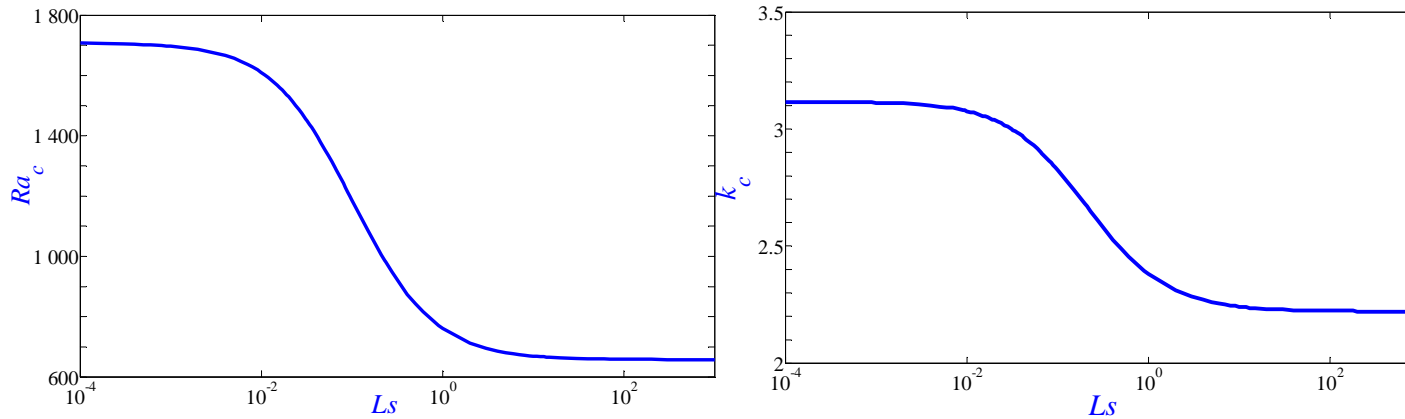# Rayleigh-Bénard convection for shear-thinning fluids:

Influence of the boundary conditions on the nature of

the bifurcation and pattern selection

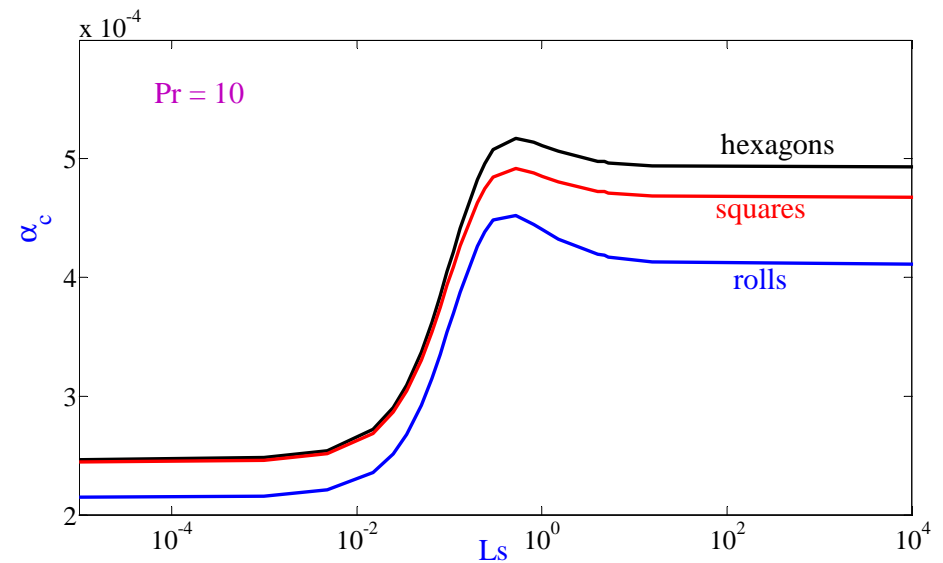**M. BOUTERAA**, C. NOUAR, A.Kalck, C. Métivier , E. Plaut

$\hat{T}_2 < \hat{T}_1$

$\hat{z}$

$\hat{d}$

Cold heavy fluid

$\vec{g}$

Warm light fluid

O

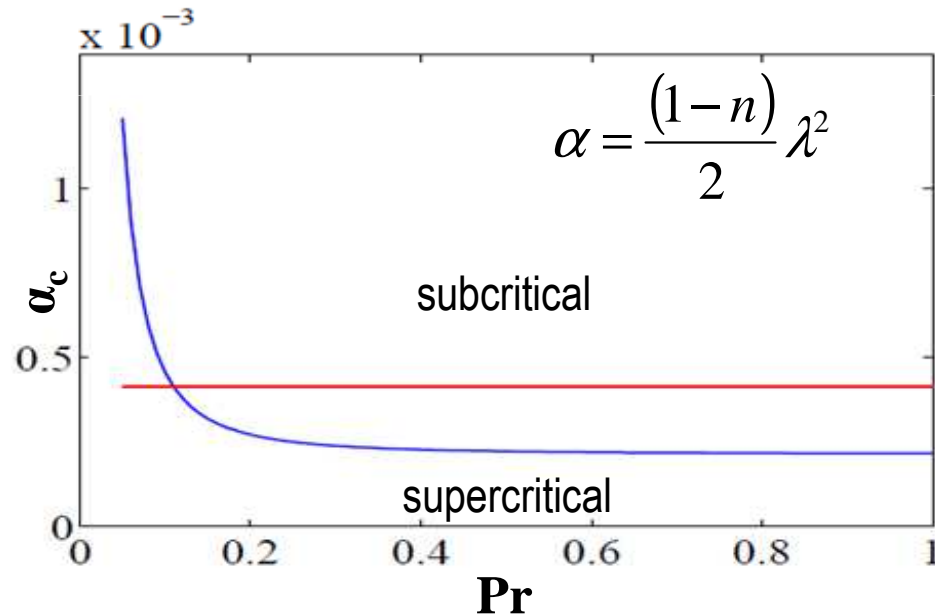$\hat{T}_1$

Navier slip boundary conditions

$$\hat{\mu} = \hat{\mu}_\infty + \left(\hat{\mu}_0 - \hat{\mu}_\infty\right)\left(1 + \hat{\Lambda}^2 \hat{\Gamma}\right)^{\frac{n-1}{2}}$$

1

Linear stability analysis: prediction of the critical conditions

But

not able to predict the flow patterns

Weakly non linear analysis

$$\alpha = \frac{(1-n)}{2}\lambda^2$$

subcritical

supercritical

Pr = 10

hexagons

squares

rolls

For sufficiently strong shear-thinning effects, the bifurcation is subcritical