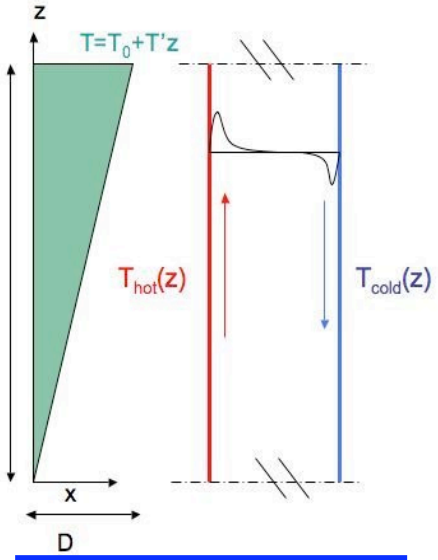
Etude d'un canal stratifié différentiellement chauffé (B. Podvin, P. Le Quéré, LIMSI-CNRS, Orsay)

Objectif: Validité d'une équation de Ginzburg-Landau cubique autour de Ra_c



$$(u,w,\theta) \rightarrow (\phi,\theta) = \psi$$

$$\Psi(x,z,t) = A_+(Z,T)e^{i(k_c z-\omega t)}\varphi_+(x) + A_-(Z,T)e^{i(k_c z+\omega t)}\varphi_-(x)$$

$$\frac{\partial A_+}{\partial T} + c_g \frac{\partial A_+}{\partial Z} = \sigma A_+ + \beta(1+ic_1)\frac{\partial^2 A_+}{\partial Z^2} - g(1+ic_2)\,|A_+|^2\,A_+$$

$$S = \frac{T'D}{\Delta T}$$

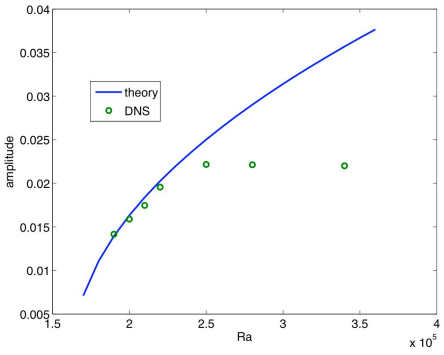
$$Ra = \frac{\alpha g \Delta T D^3}{\kappa \nu}$$

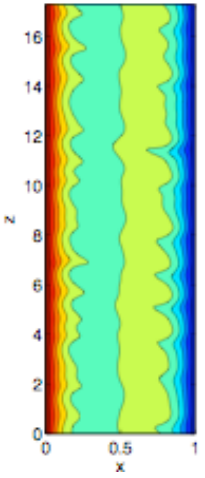
$$\mathrm{Pr} = \frac{\nu}{\kappa} = 0.71$$

$$\gamma = \left(\frac{1}{4}RaS\right)^{1/4} = 8$$

Amplitude de Landau correcte pour $\varepsilon < 0.6$

C_1=1.29, C_2=-1.23
Eckhaus instable





LIMITE DE VALIDITE DU MODELE DE GINZBURG-LANDAU

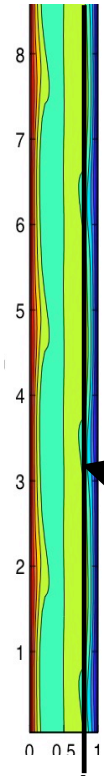
$1.6\ 10^5\ Ra_c < Ra < Ra_{c1}=2.7\ 10^5$

Ondes progressives → ondes progressives modulées

Eckhaus instable

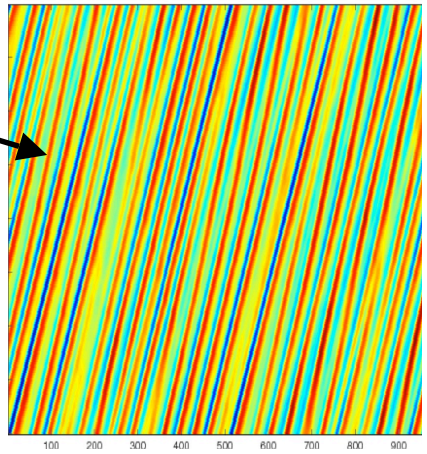
Chaos d'amplitude

GL VALIDE



Température fluctuante

Ra=2.5 10^5

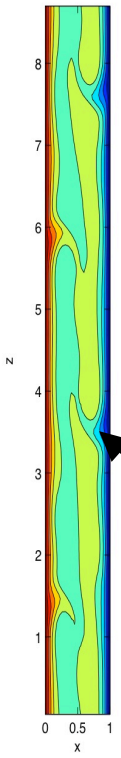


$Ra > Ra_{c1}=2.7\ 10^5$

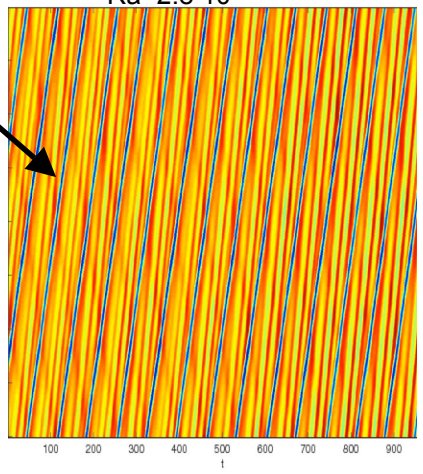
Ondes cnoidales

Stables

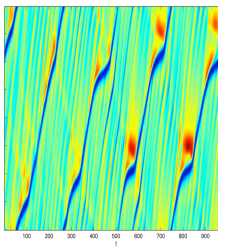
GL non VALIDE



Ra=2.8 10^5



Ra=3.3 10^5



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