Possible plan

- I) Problem Linearization.
- II) Iterative solvers and preconditionning.
- III) Practical computation.
  - i) Getting rid of B^{-1} and Changing the resolution.
  - ii) Usual but inconsistent strategy.
  - iii) Consistent strategy.
- IV) Equivalence conditions.
  (peut-on demontrer ces conditions dans un cadre general ?)

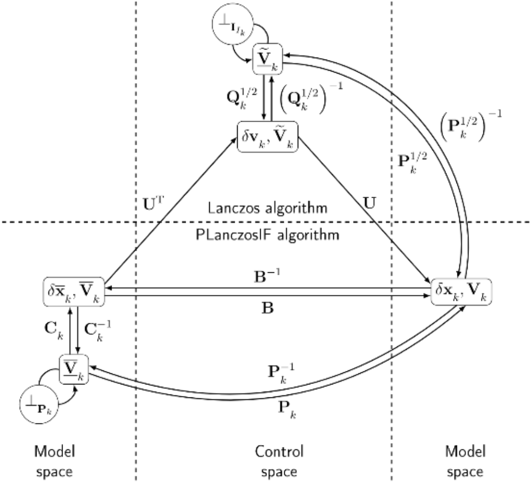
Possible plan

- IV) A quantitative illustration of the inconsistant strategy on a simple example.
  (a-t-on une idee quantitative de l'erreur commise ?)
  (comportement de cette erreur en passant à un vrai modele physique ?)
  (comportement de cette erreur en changeant de preconditionneur/d'espace ?)
- V) Application of the consistent strategy to a physical model.
  (quel modele utiliser ? Pour convaincre qui ?)

Code Multi

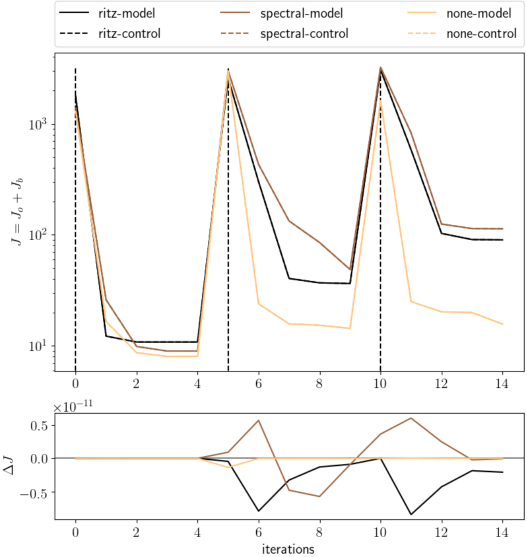
- Compute $J = J_o + J_b$.
- Uses Lanczos in model space and PlanczosIF in control space.
- Allow to vary : $var(\sigma^b)$, σ^o, L_b, N_{obs}, inner/outer iterations, preconditionning (Ritz vector, Spectral method, none).

Code Multi

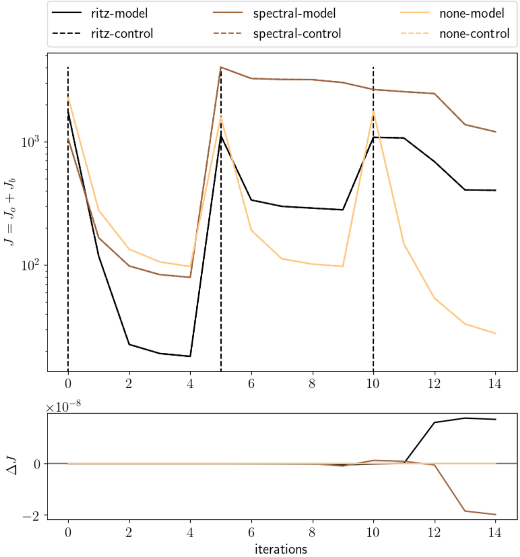


$\perp_{\mathbf{I}_{I_k}}$
$\widetilde{\mathbf{V}}_k$
$\mathbf{Q}_k^{1/2}$
$\left(\mathbf{Q}_k^{1/2}\right)^{-1}$
$\delta\mathbf{v}_k, \widetilde{\mathbf{V}}_k$
$\left(\mathbf{P}_k^{1/2}\right)^{-1}$
$\mathbf{P}_k^{1/2}$
$\mathbf{U}^{\mathrm{T}}$
Lanczos algorithm
$\mathbf{U}$
PLanczosIF algorithm
$\mathbf{B}^{-1}$
$\delta\overline{\mathbf{x}}_k, \overline{\mathbf{V}}_k$
$\delta\mathbf{x}_k, \mathbf{V}_k$
$\mathbf{B}$
$\mathbf{C}_k$
$\mathbf{C}_k^{-1}$
$\underline{\overline{\mathbf{V}}}_k$
$\mathbf{P}_k^{-1}$
$\perp_{\mathbf{P}_k}$
$\mathbf{P}_k$
Model space
Control space
Model space

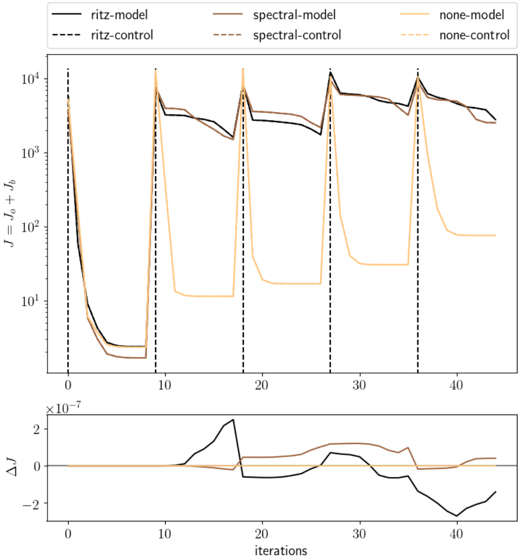
Outputs of the code($L_b = 0.005, N_{obs} = 128$)



Outputs of the code($L_b = 0.001, N_{obs} = 128$)



Outputs of the code($L_b = 0.005, N_{obs} = 2048$)



- Réorthogonalisation.
- ΔJ en fonction des paramètres.
- Coder la méthode usuelle pour comparer.