Content

- Non linearity induced by H operator : $(Hx = (1 - \alpha)x + \alpha x^3)$.
- Relinearization at outer loops level
- Influence of the σ^o and n_{obs}

Full resolution, varying α parameter with the same relinearization scheme : $no = 4, ni = 6$,
spectral interpolation and projective B matrix, $\sigma^o = 0.01$

Full resolution ; linear H ; J vs J^{nl}

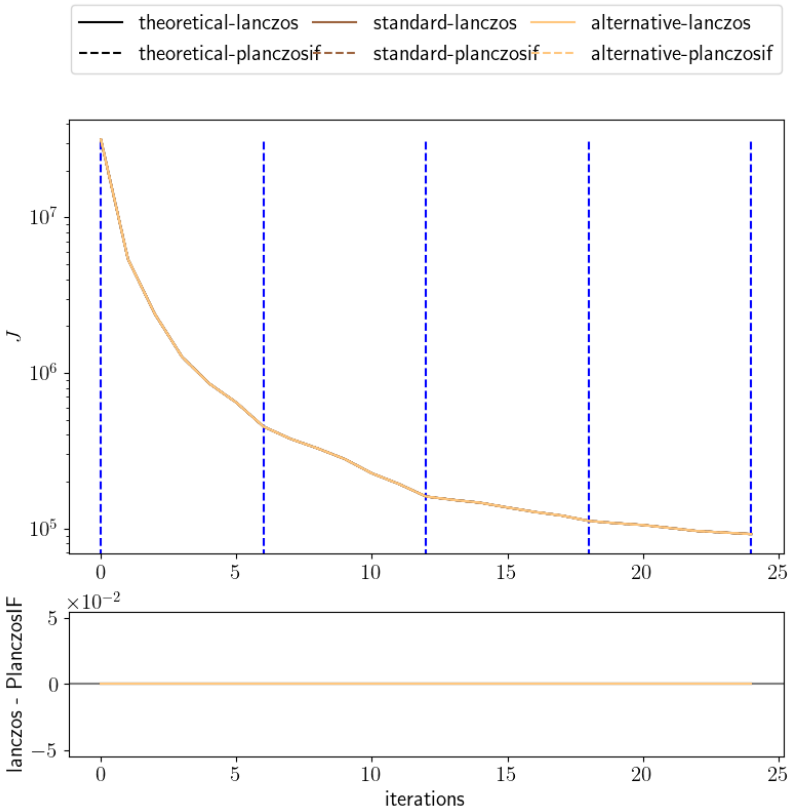

FIGURE – $\alpha = 0$

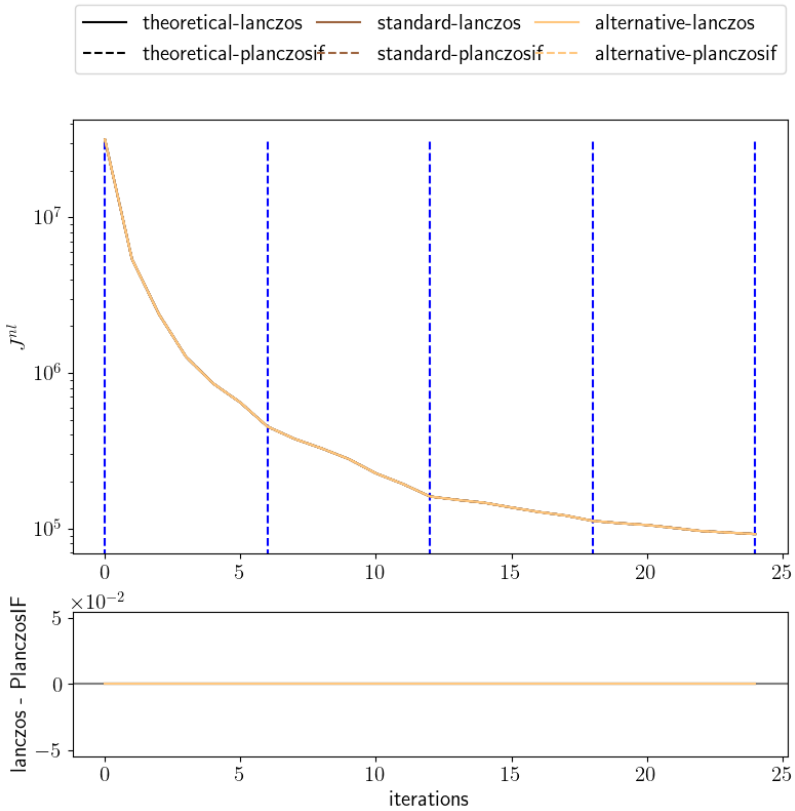

FIGURE – $\alpha = 0$

Full resolution ; non linear H ; J vs J^{nl}

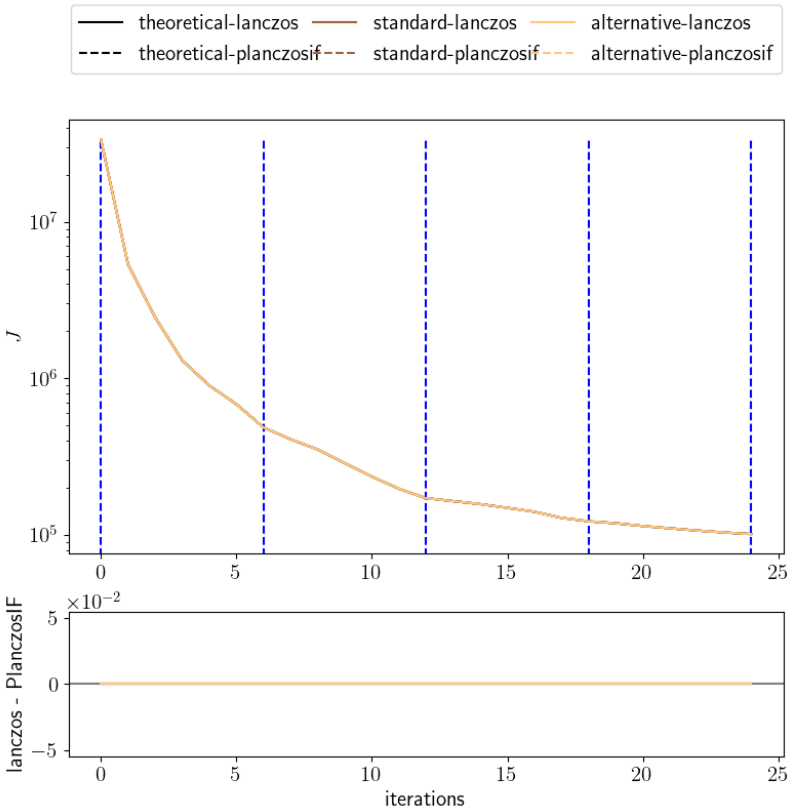

FIGURE – $\alpha = 0.01$

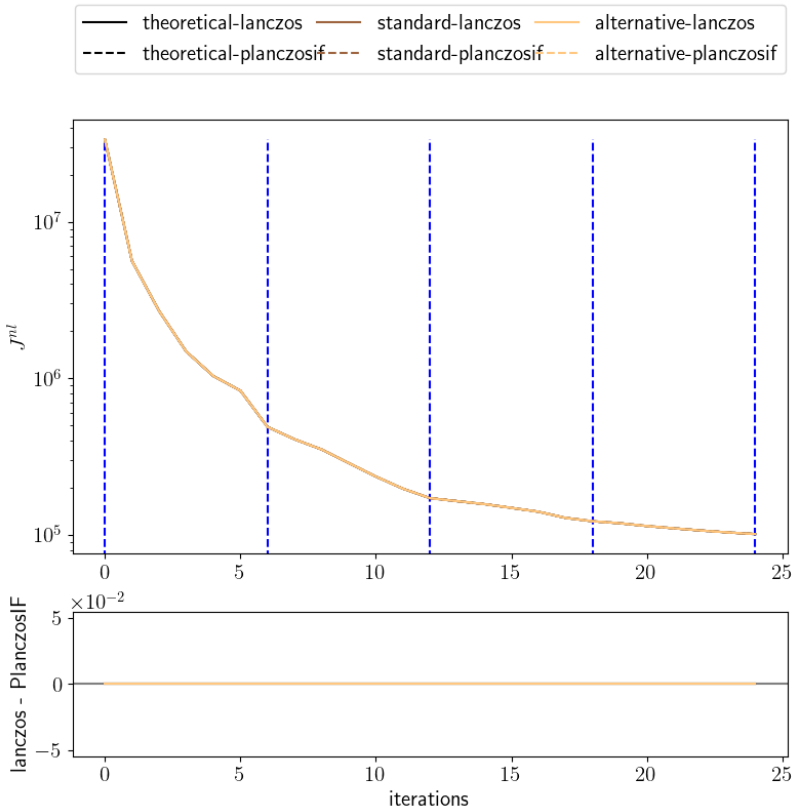

FIGURE – $\alpha = 0.01$

Full resolution ; non linear H ; J vs J^{nl}

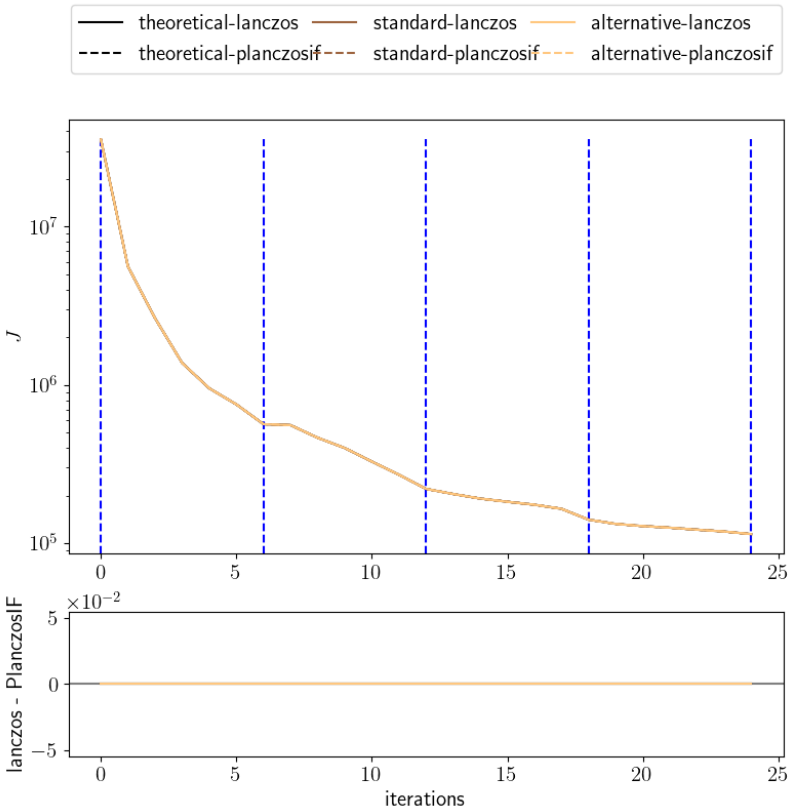

FIGURE – $\alpha = 0.02$

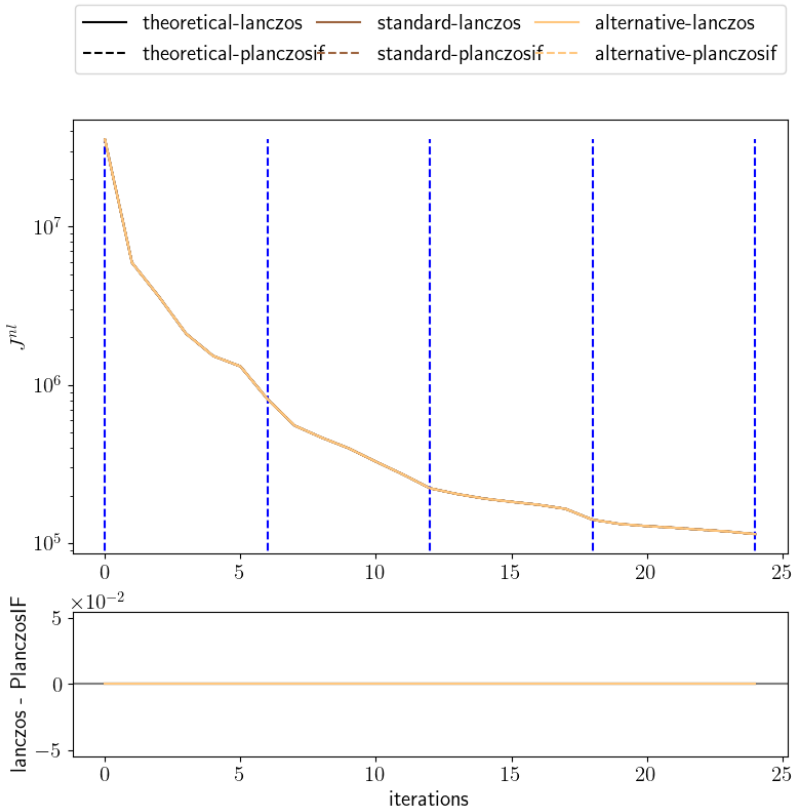

FIGURE – $\alpha = 0.02$

Full resolution ; non linear H ; J vs J^{nl}

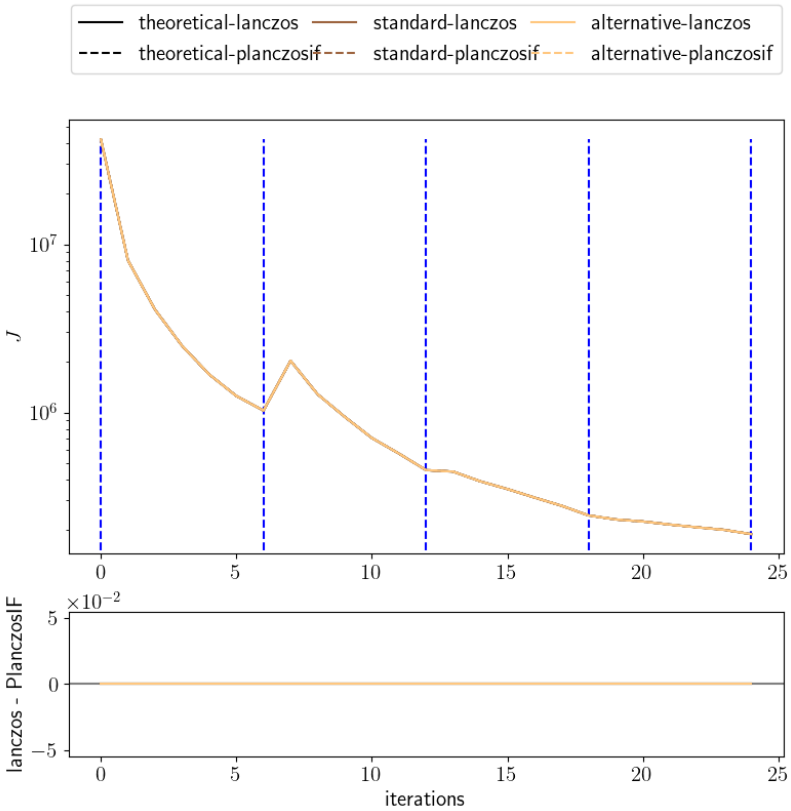

FIGURE – $\alpha = 0.05$

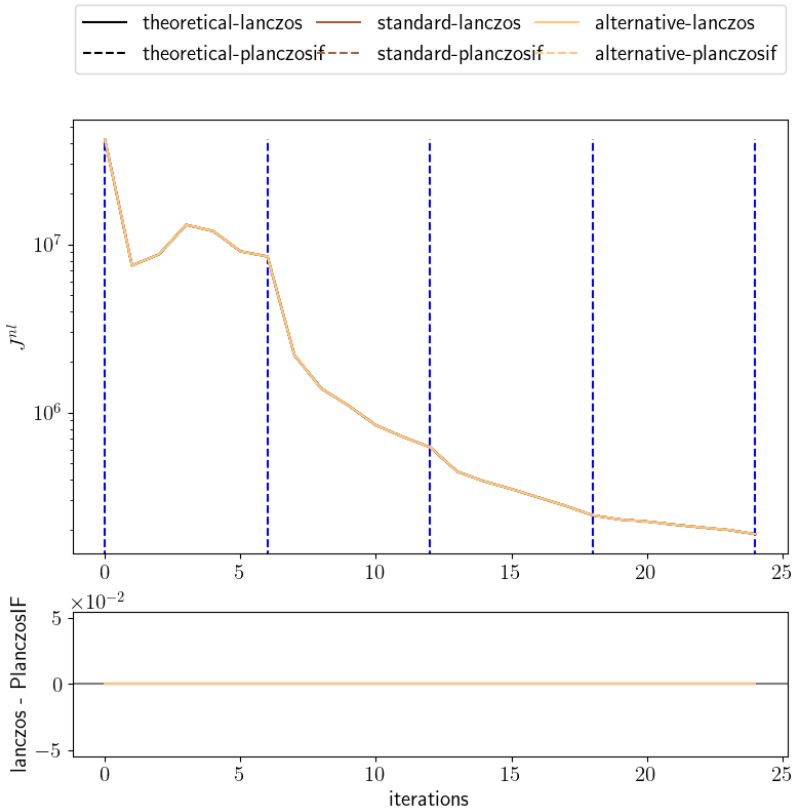

FIGURE – $\alpha = 0.05$

Full resolution ; non linear H ; J vs J^{nl}

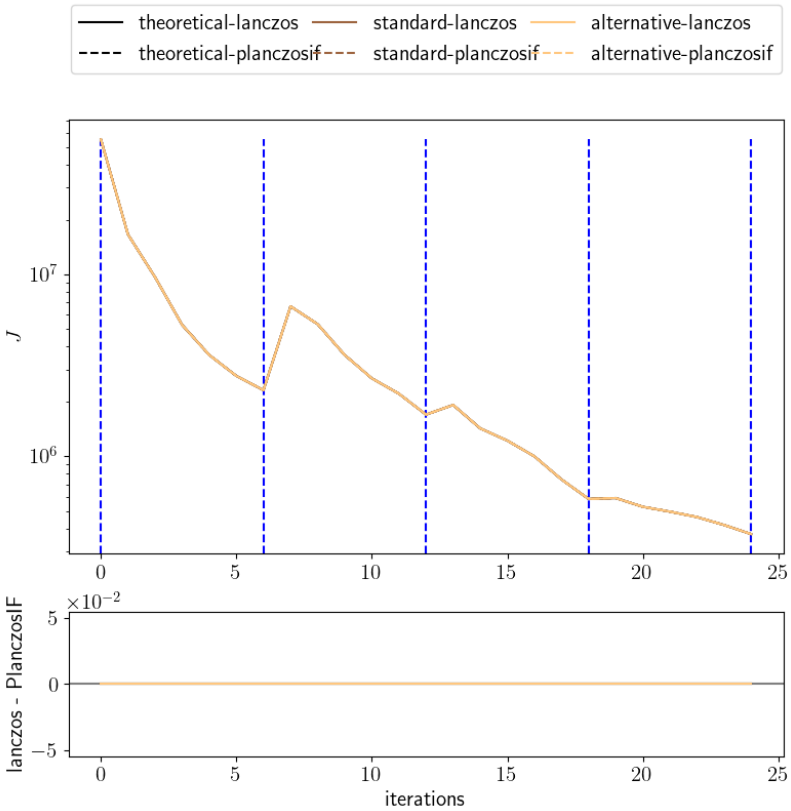

FIGURE – $\alpha = 0.1$

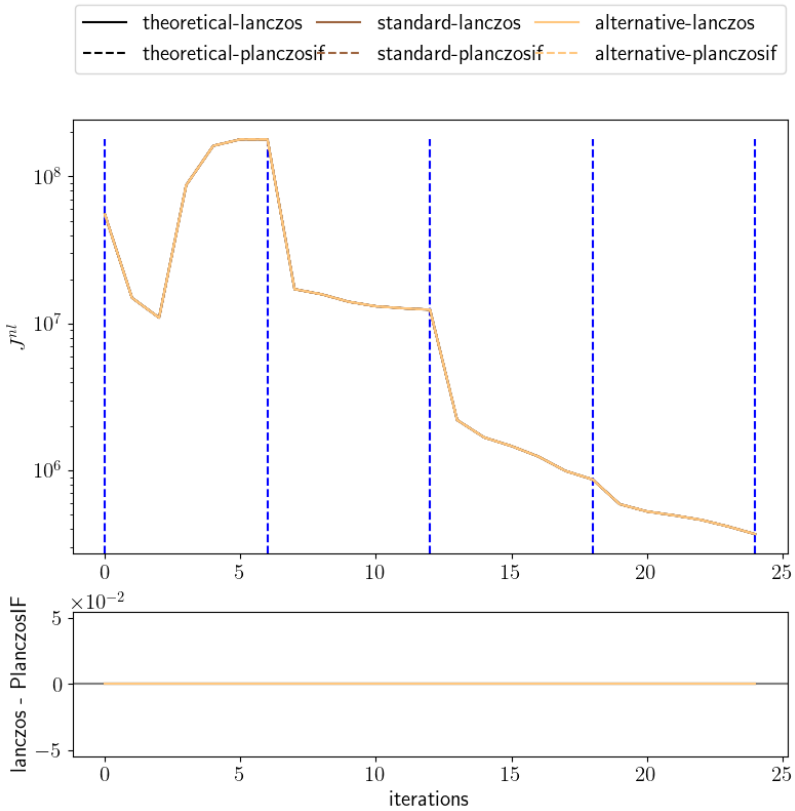

FIGURE – $\alpha = 0.1$

Full resolution ; non linear H ; J vs J^{nl}

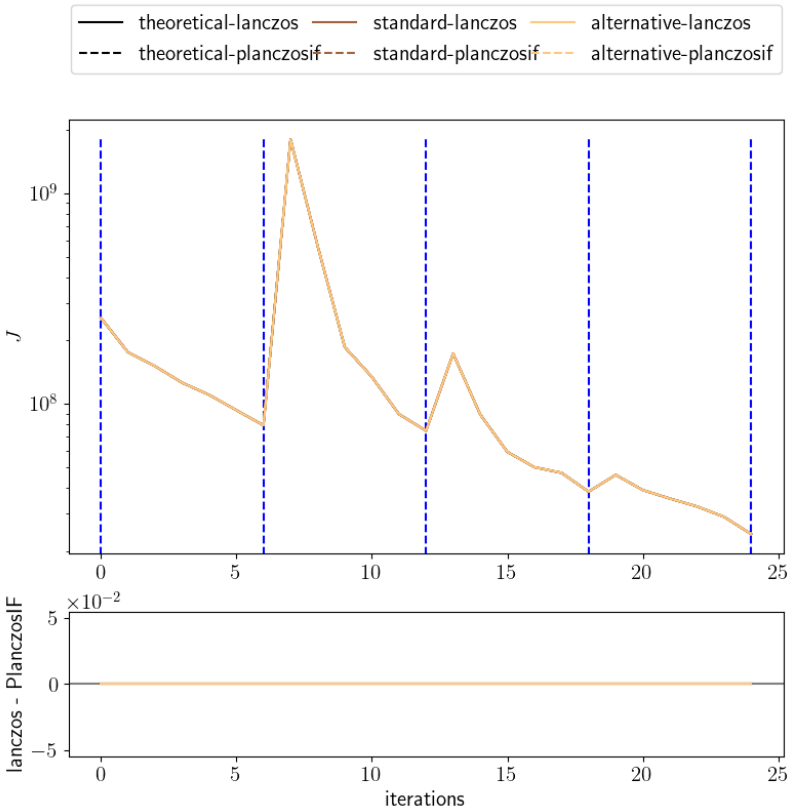

FIGURE – $\alpha = 0.5$

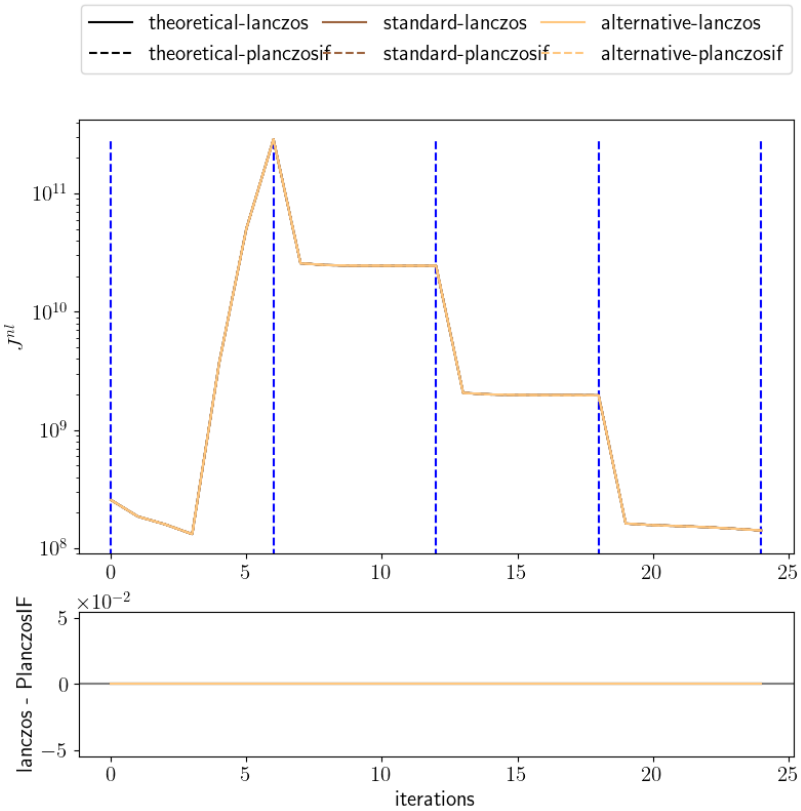

FIGURE – $\alpha = 0.5$

Full resolution ; non linear H ; J vs J^{nl}

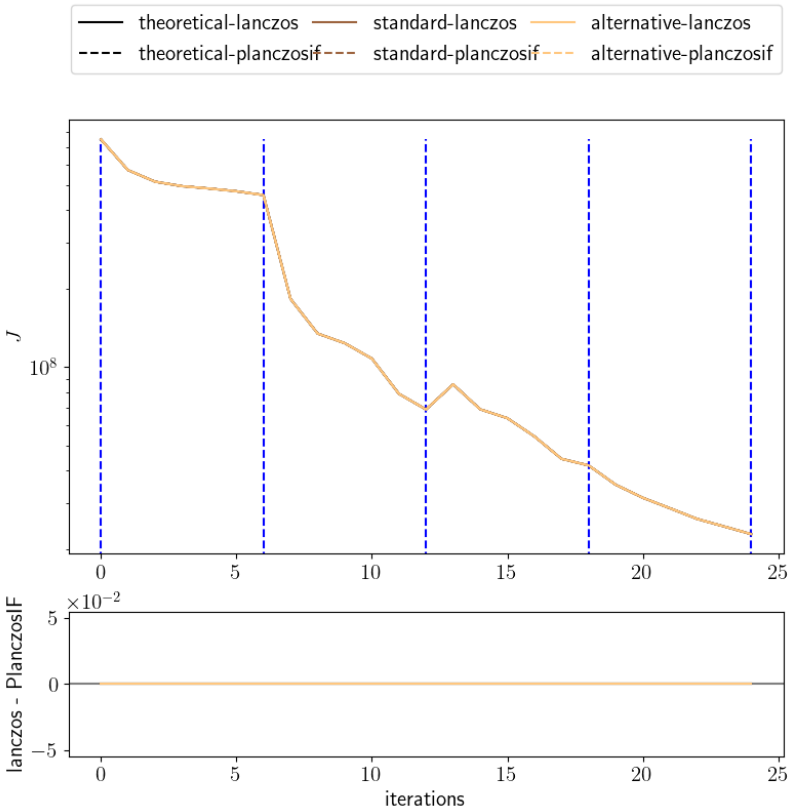

FIGURE – $\alpha = 1$

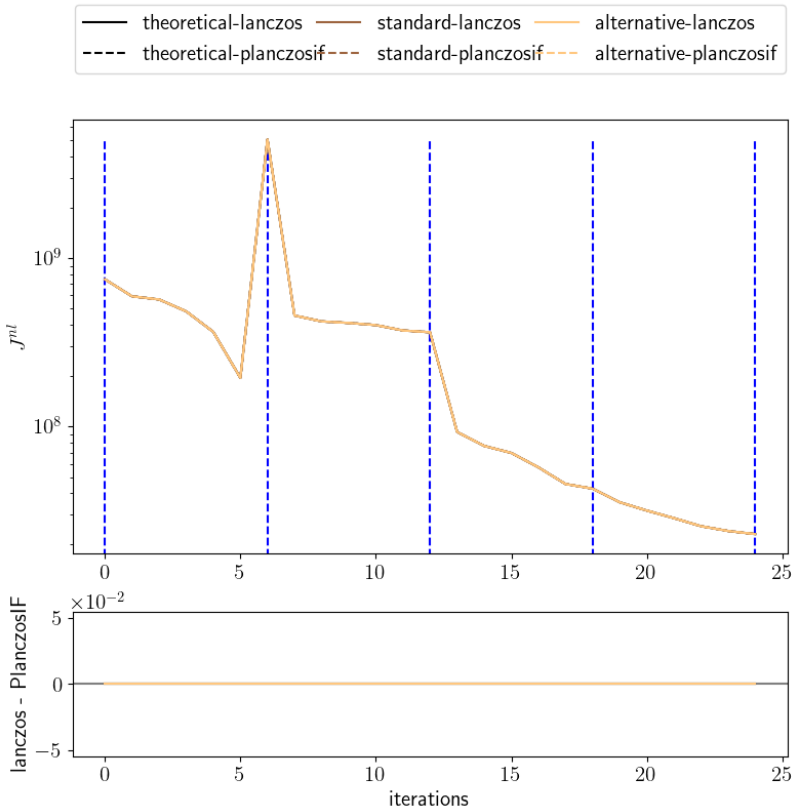

FIGURE – $\alpha = 1$

Conclusion on the non linearity induced by H

- Very sensitive to α even for small values.
- The case with $\alpha = 1$ seems better than the case with $\alpha = 0.05$...
  $\longrightarrow$ What could be the reason for it ?
- It seems that there are too much inner loops before relinearization but the iteration at which the "jump" occurs seems NOT correlated to the value of α.

$\longrightarrow$ Need to study the number of inner iterations vs. outer iterations.

Full resolution, varying the number of inner and outer loops with a non linear H and the same total number of iterations ($n_o \times n_i = 24$) (spectral interpolation and projective B matrix, $\sigma^o = 0.01$)

Full resolution ; non linear H ($\alpha = 0.05$) : J^{nl}

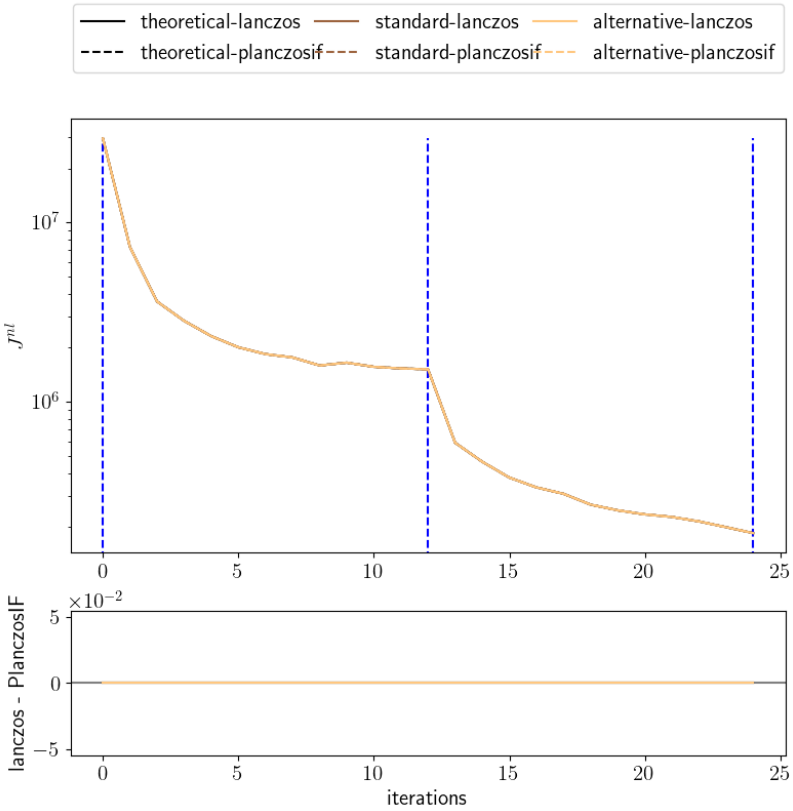

FIGURE – $n_o = 2, n_i = 12$

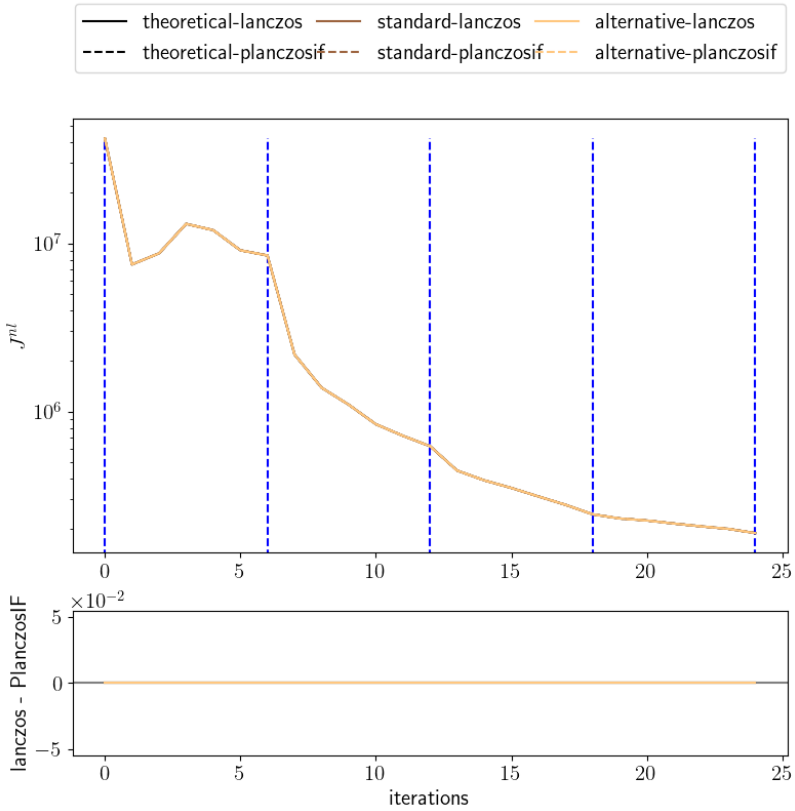

FIGURE – $n_o = 4, n_i = 6$

Full resolution ; non linear H ($\alpha = 0.05$) : J^{nl}

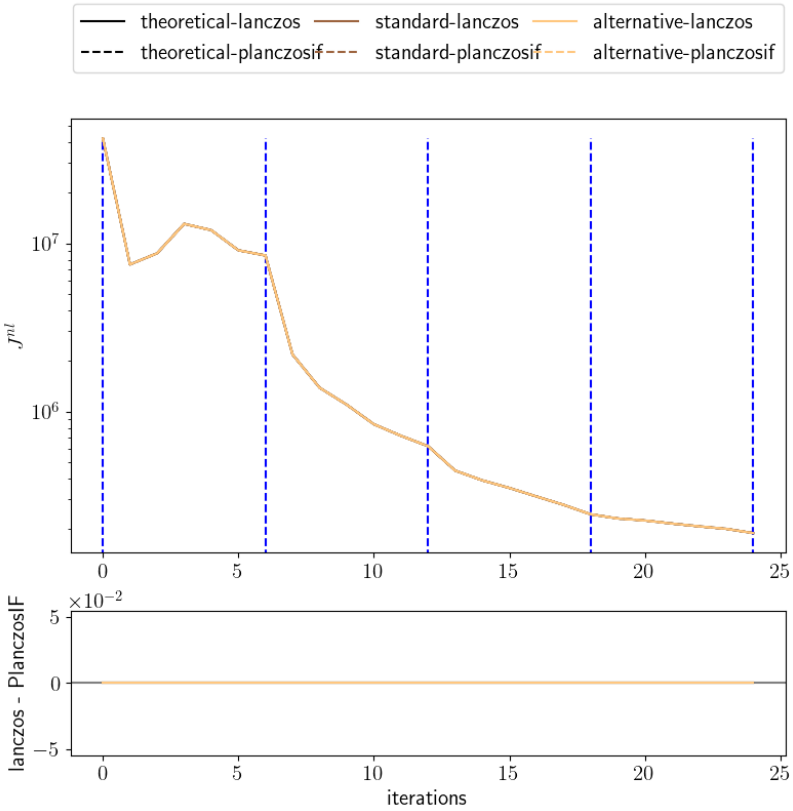

FIGURE – $n_o = 4, n_i = 6$

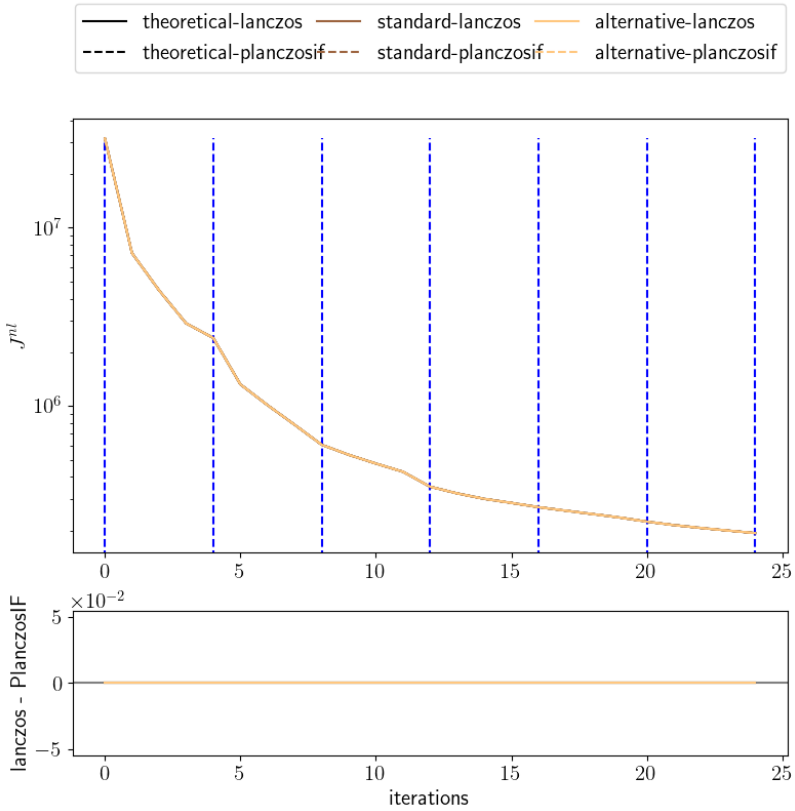

FIGURE – $n_o = 6, n_i = 4$

Full resolution ; non linear H ($\alpha = 0.05$) : J

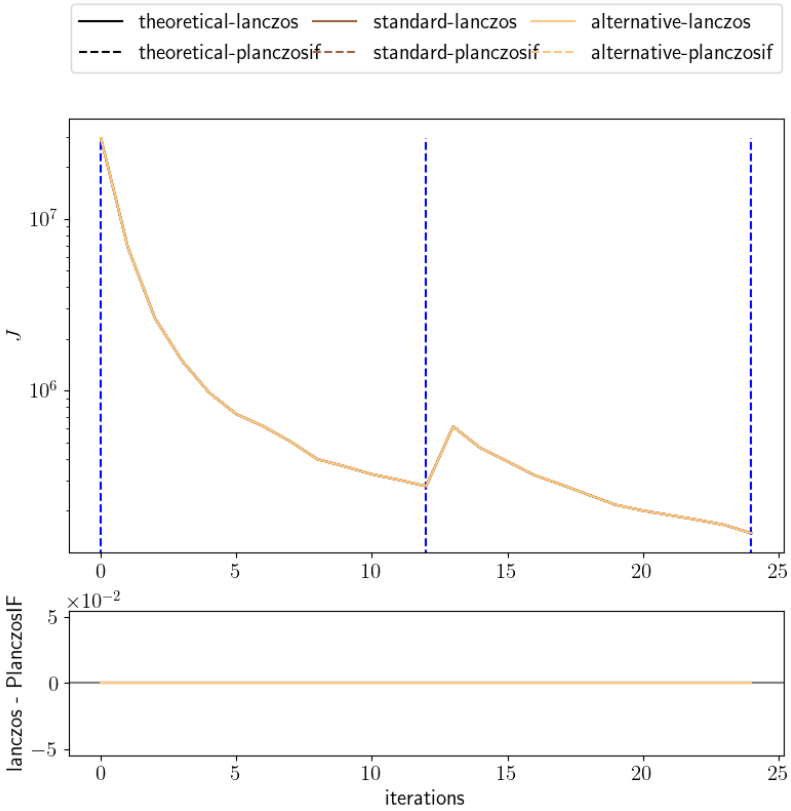

FIGURE – $n_o = 2, n_i = 12$

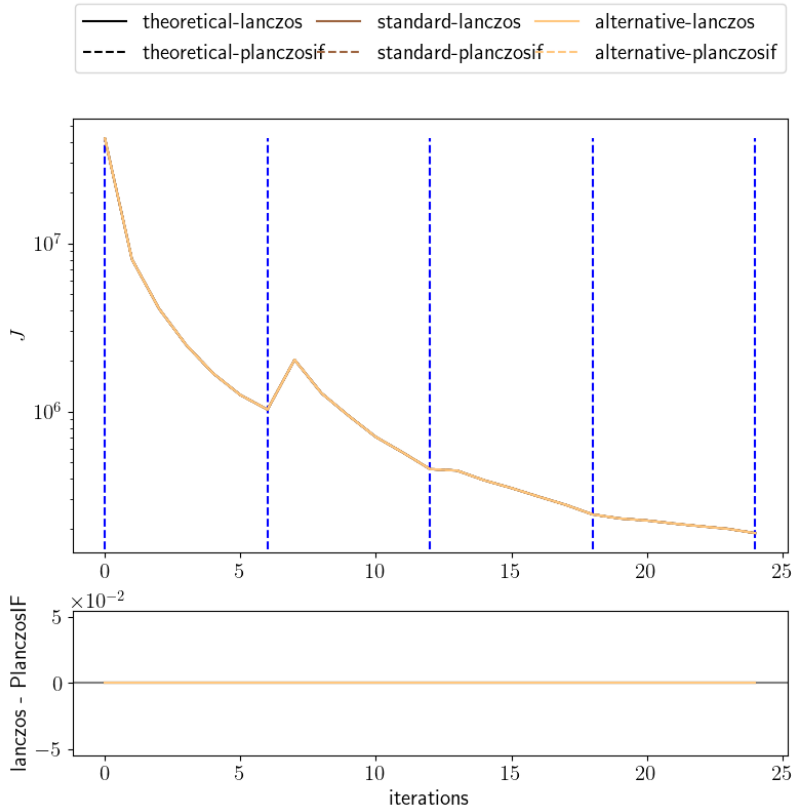

FIGURE – $n_o = 4, n_i = 6$

Full resolution ; non linear H ($\alpha = 0.05$) : J

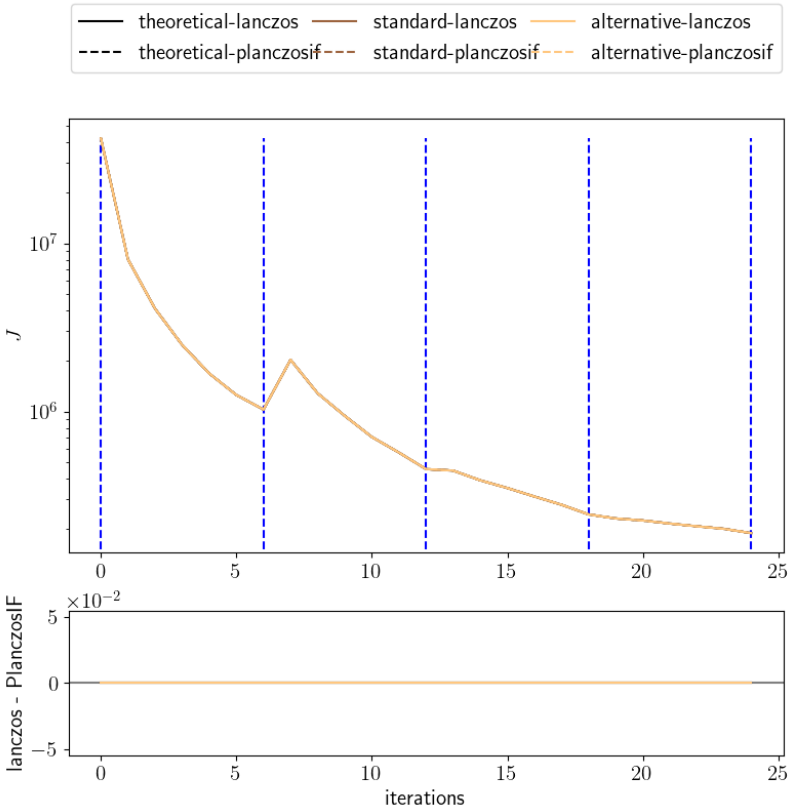

FIGURE – $n_o = 4, n_i = 6$

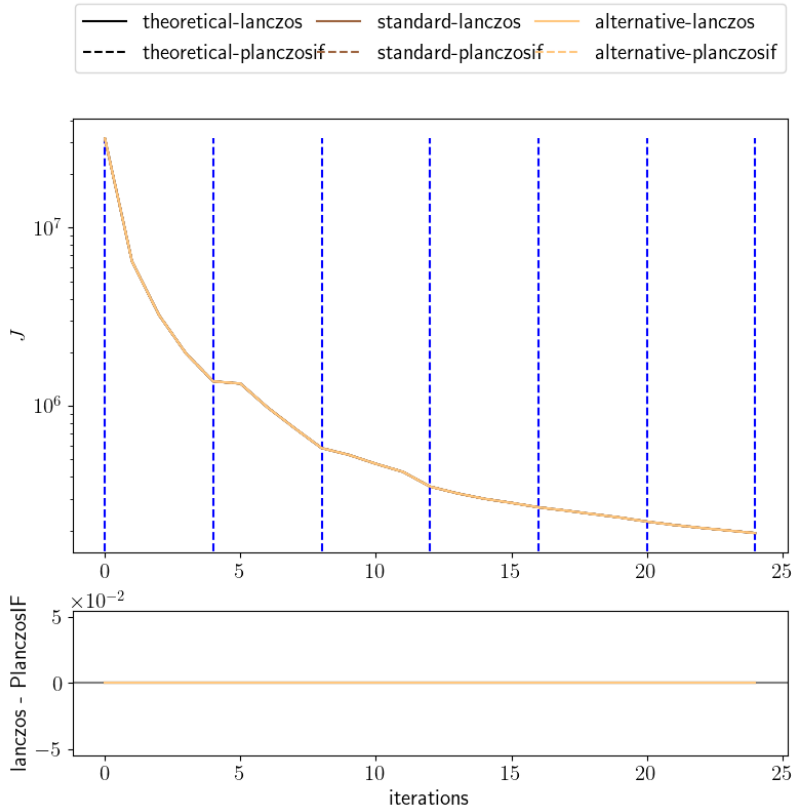

FIGURE – $n_o = 6, n_i = 4$

Full resolution ; non linear H ($\alpha = 0.1$) : J^{nl}

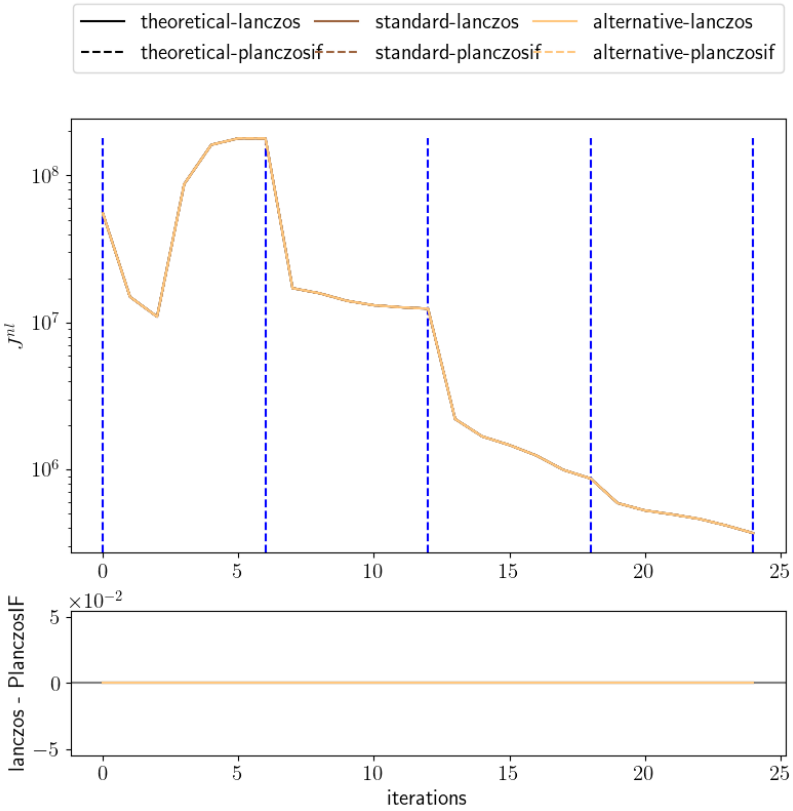

FIGURE – $n_o = 4, n_i = 6$

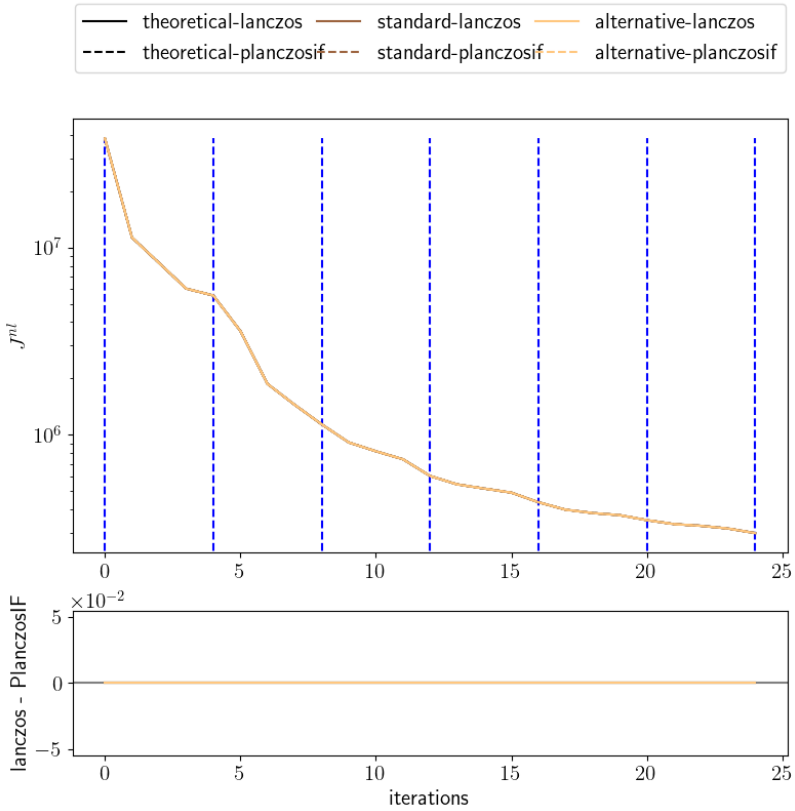

FIGURE – $n_o = 6, n_i = 4$

Full resolution ; non linear H ($\alpha = 0.1$) : J

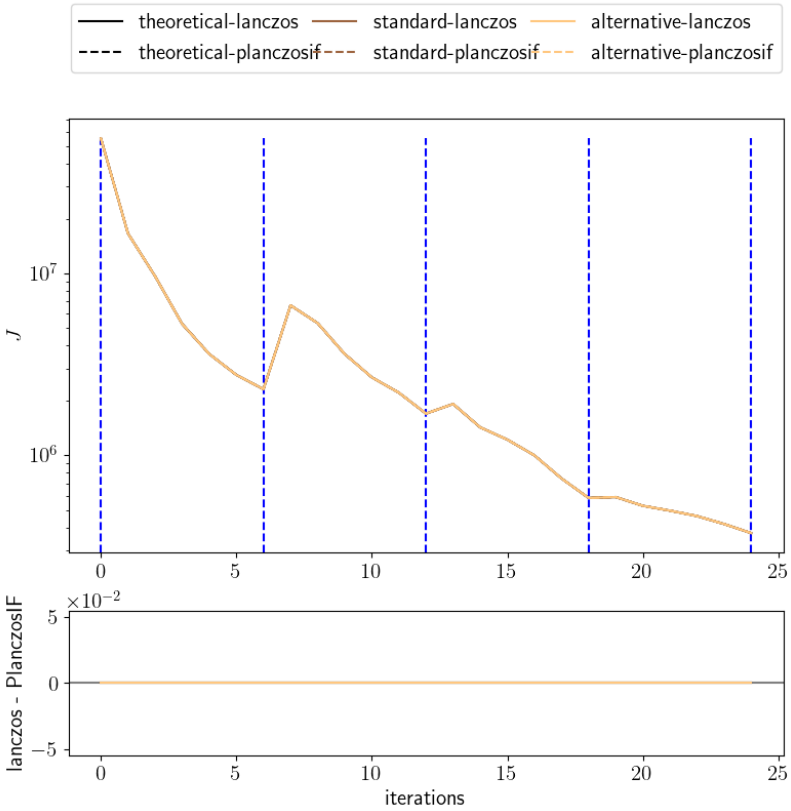

FIGURE – $n_o = 4, n_i = 6$

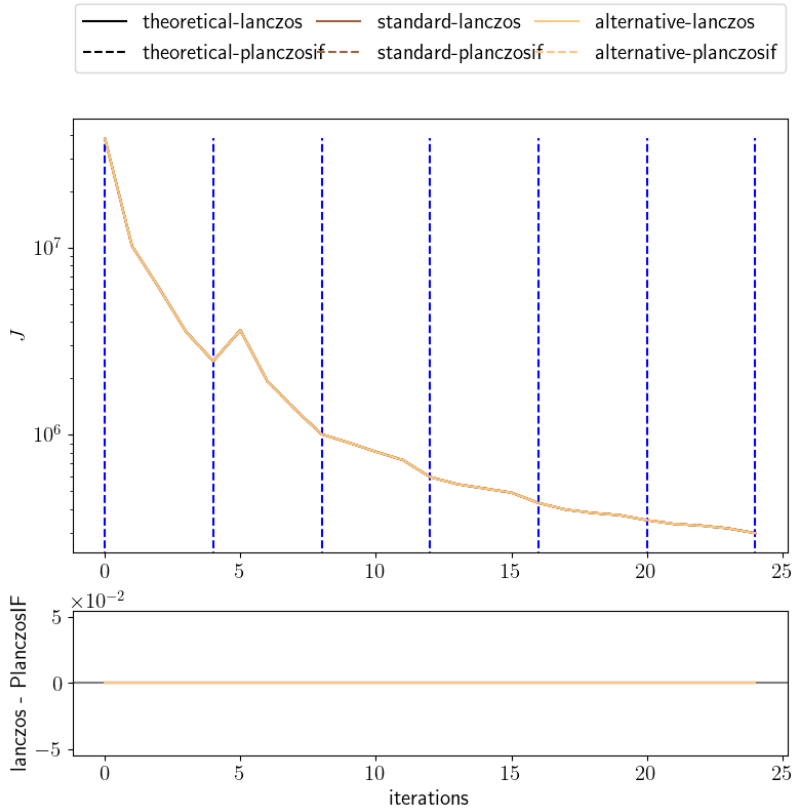

FIGURE – $n_o = 6, n_i = 4$

Full resolution ; non linear H ($\alpha = 1$) : J^{nl}

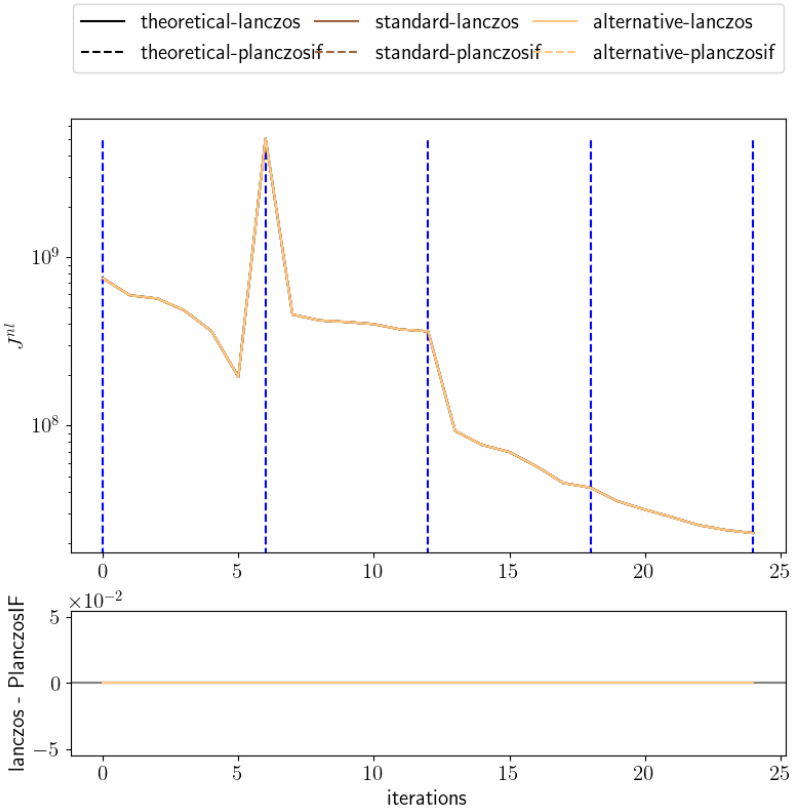

FIGURE – $n_o = 4, n_i = 6$

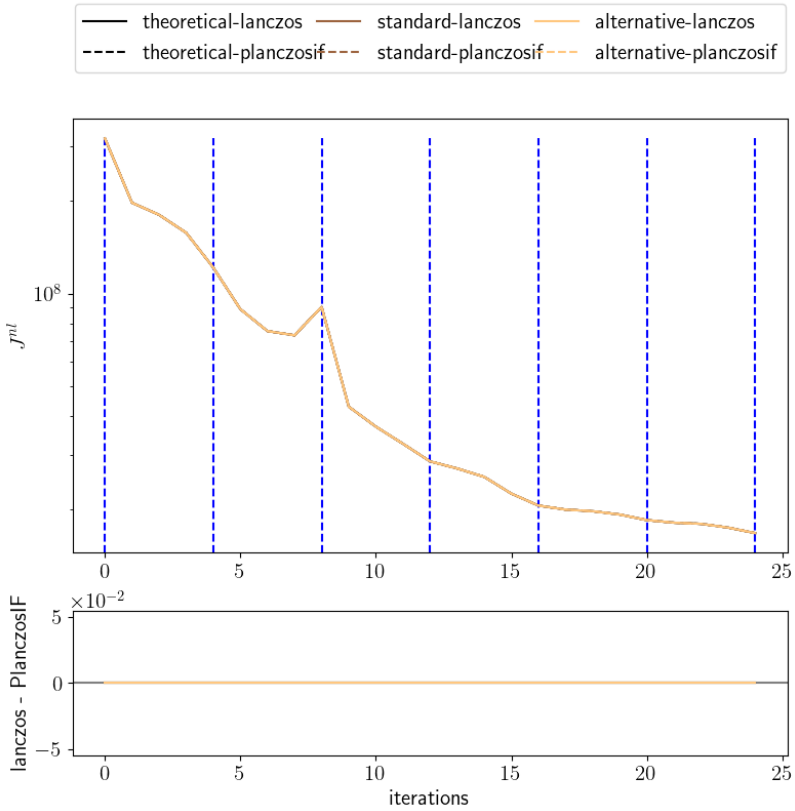

FIGURE – $n_o = 6, n_i = 4$

Full resolution ; non linear H ($\alpha = 1$) : J

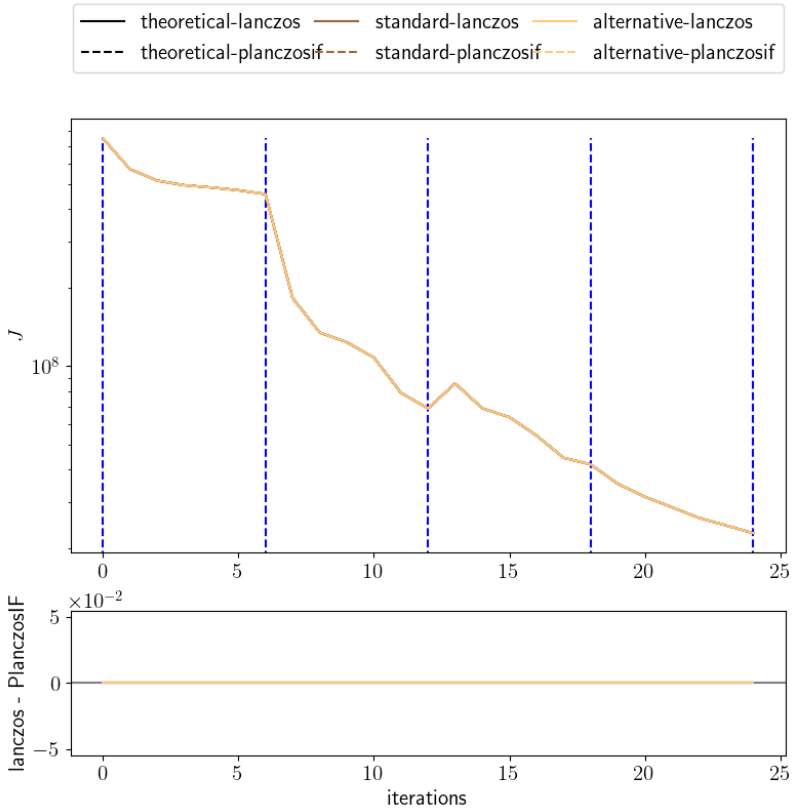

FIGURE – $n_o = 4, n_i = 6$

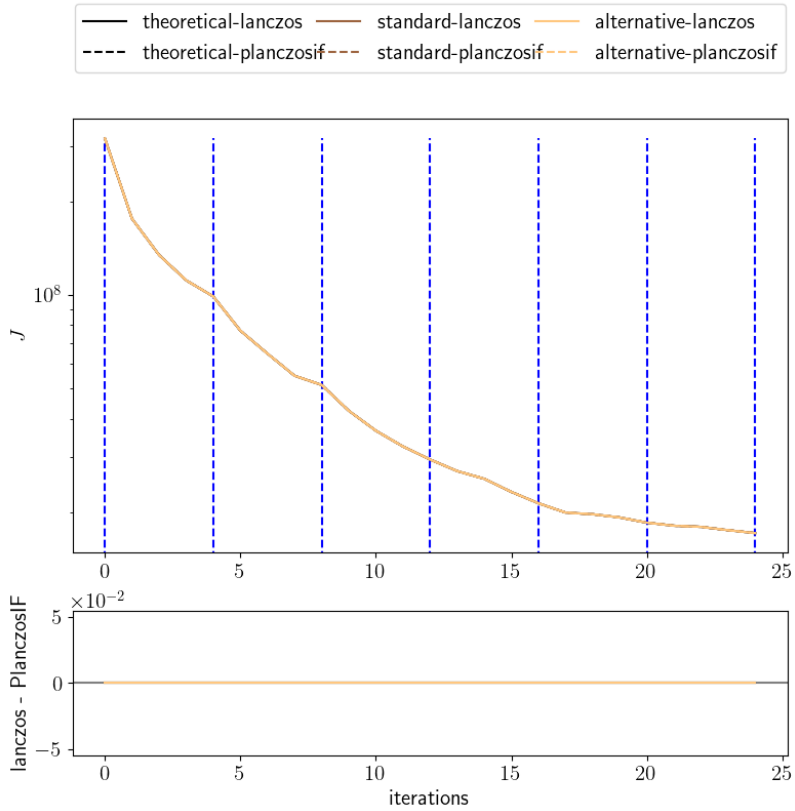

FIGURE – $n_o = 6, n_i = 4$

Conclusion on the number of inner and outer loops

- As expected, the assimilation scheme with the more outer loops is equal or better than the others.
- There is often a "jump" in the linear cost function which is not necessarily at the same iteration than the eventual "jump" in the non linear one.
- Problem : The firsts inner iterations in the first case with 12 inner iterations seems better than the case with 6 inner iterations whereas the case with 6 inner iterations seems better than the case with 6 inner iterations :
  $\longrightarrow$ The problem is too much dependant on the initial background and observation states that are randomly generated (?) : there is a difference of 10^7 at the beggining !

Short conclusion and questions :

- lala