Nonlinear interaction in Barotropic Vorticity Equation on the sphere

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Abstract

Preliminar presentation of simulation results.

1 Test case 1

This test case includes in the initial condition energy on modes $(2, 1)$, $(3, 3)$, $(4, 2)$, as shown in figure 1.

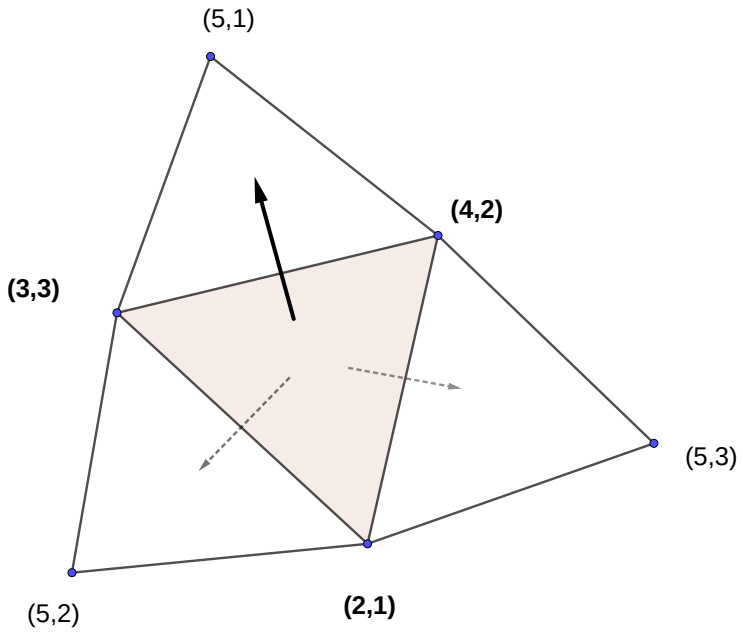

Figure 1: Ilustration of triplet interaction for test case 1. Modes described as (n, m).

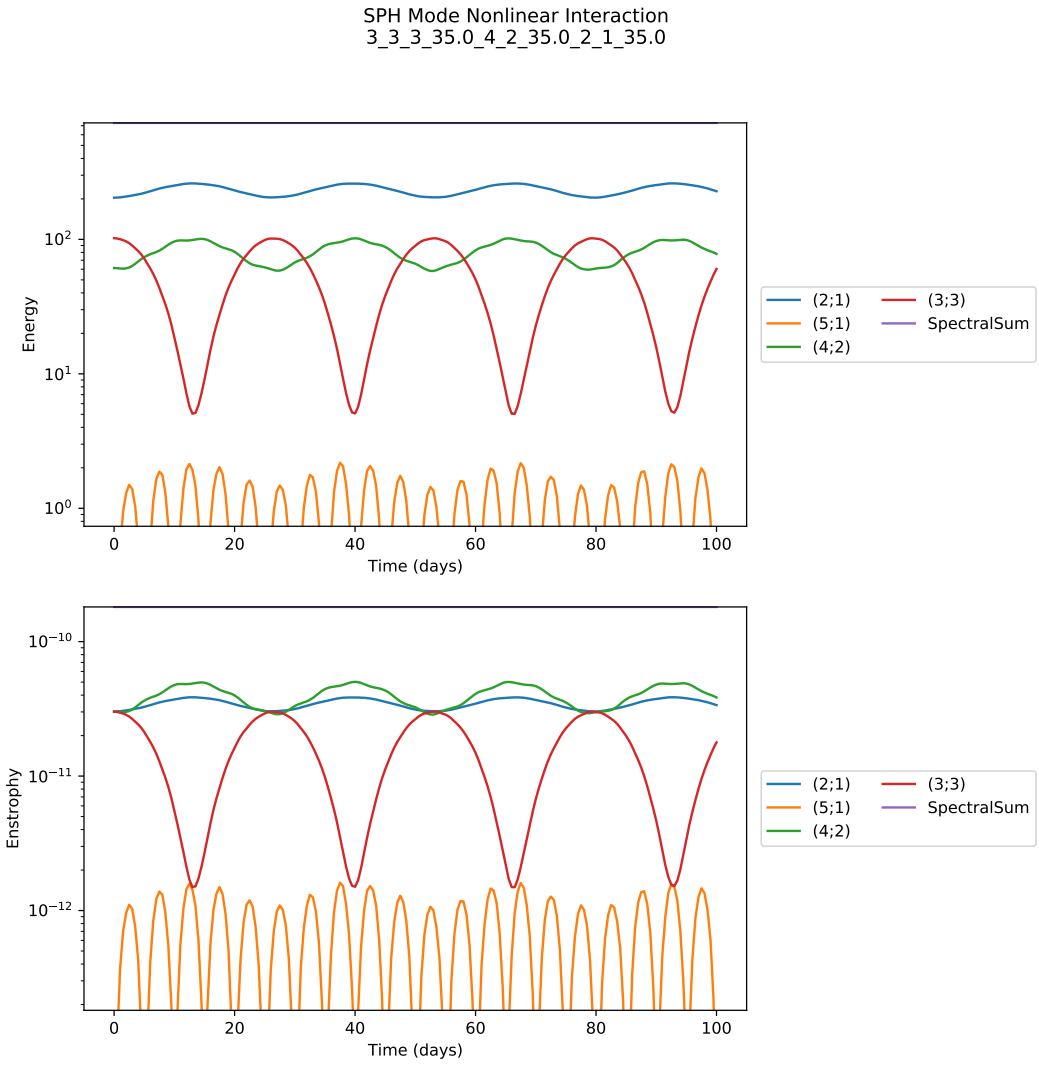

Figure 2: Evolution of energy in specific modes considering initial condition with $\alpha = 35$ on modes $(2,1)$, $(3,3)$, $(4,2)$.

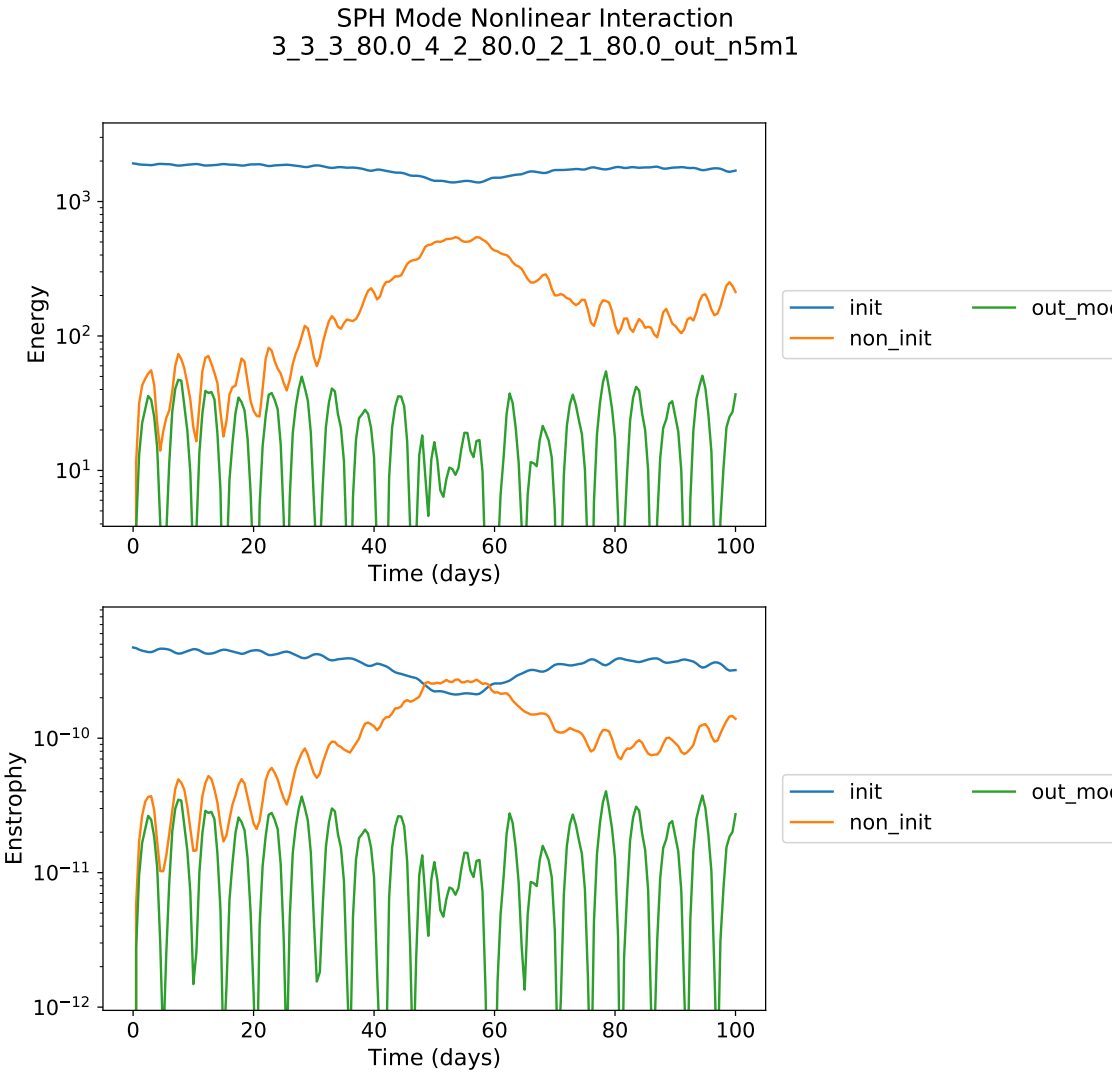

Figure 3: Evolution of energy in specific modes considering initial condition (init) with $\alpha = 80$ on modes $(2,1)$, $(3,3)$, $(4,2)$. Non-init are all other modes not on initial condition and out-mode is mode $(5,1)$.

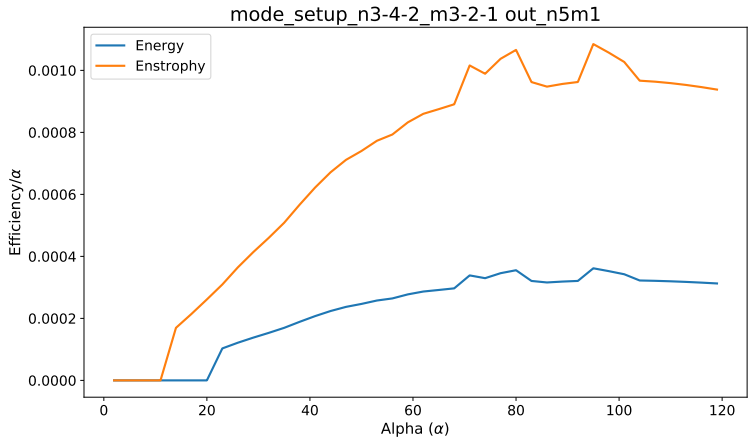

Figure 4: Efficiency for test case with initial condition in modes modes $(2,1)$, $(3,3)$, $(4,2)$ monitoring the energy transfer to mode $(5,1)$.

2 Test case 2

This test case includes in the initial condition energy on modes $(3,1)$, $(5,4)$, $(7,3)$, as shown in figure 2.

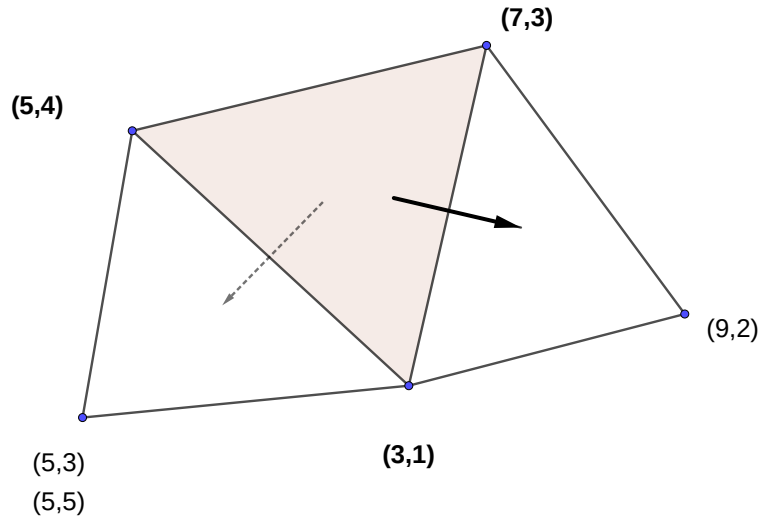

Figure 5: Ilustration of triplet interaction for test case 2. Modes described as (n,m).

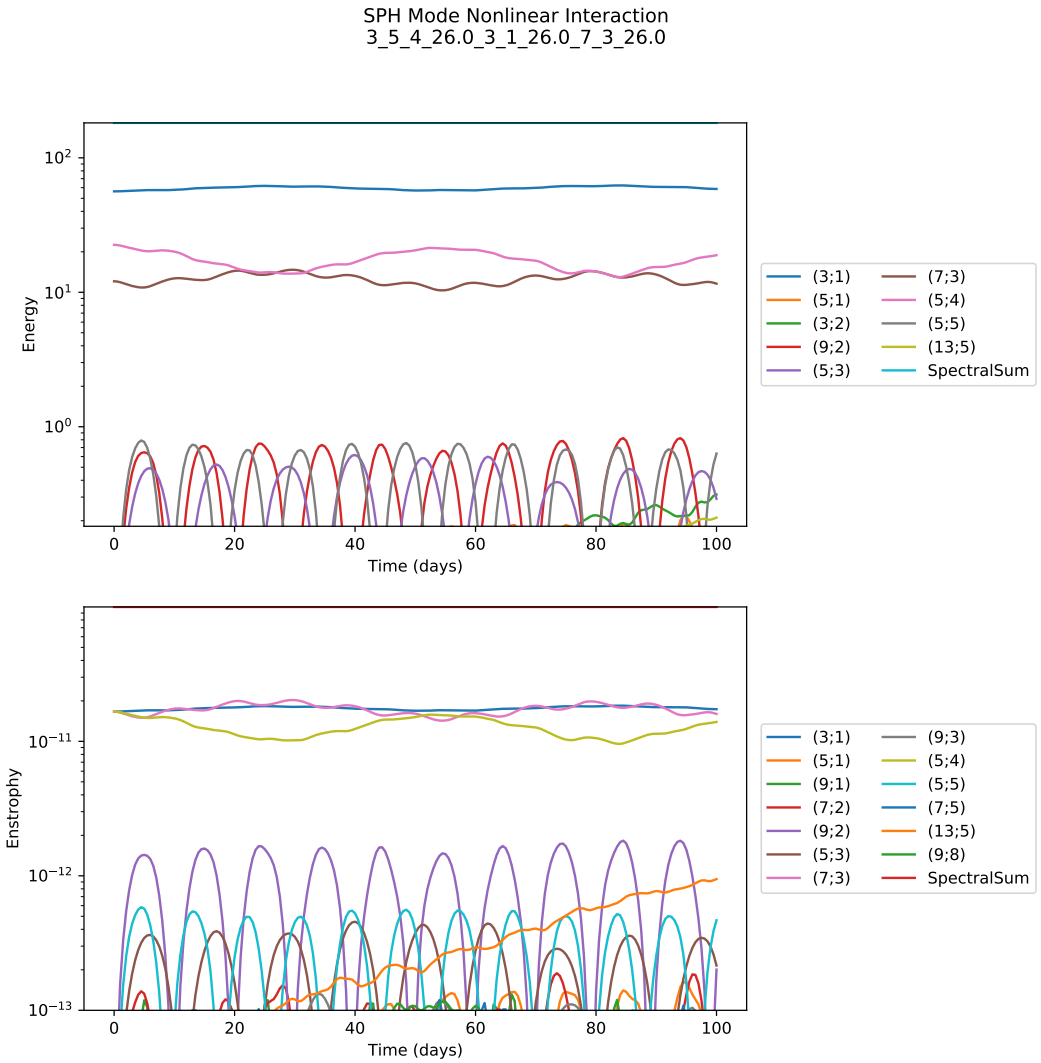

Figure 6: Evolution of energy in specific modes considering initial condition with $\alpha = 26$ on modes $(3, 1)$, $(5, 4)$, $(7, 3)$.

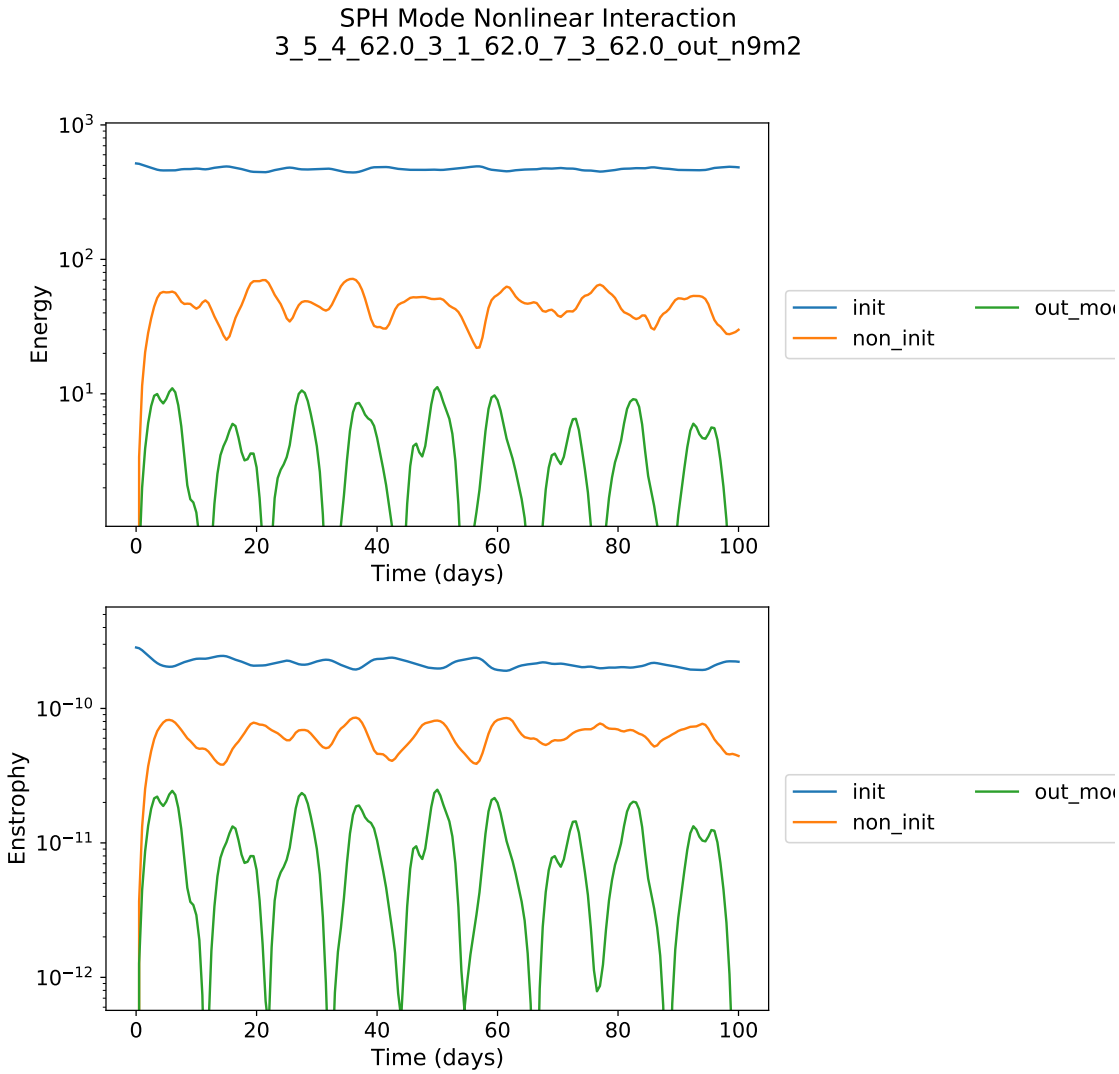

Figure 7: Evolution of energy in specific modes considering initial condition (init) with $\alpha = 62$ on modes $(3,1)$, $(5,4)$, $(7,3)$. Non-init are all other modes not on initial condition and out-mode is mode $(9,2)$.

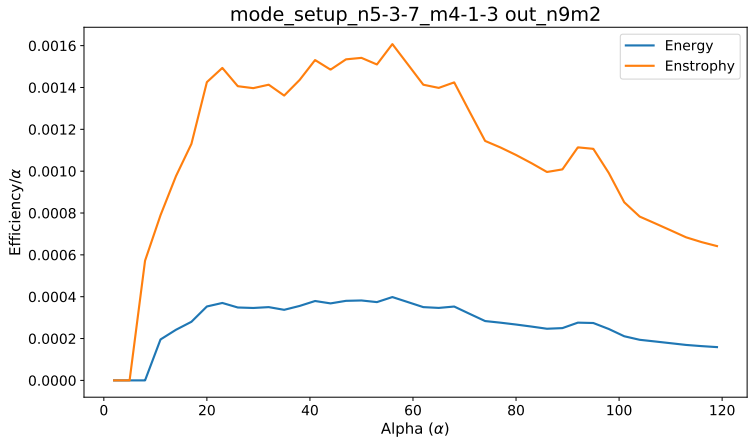

Figure 8: Efficiency for test case with initial condition in modes modes $(3, 1)$, $(5, 4)$, $(7, 3)$ monitoring the energy transfer to mode $(9, 2)$.

3 Test cases with background energy

In preliminar experiments with the pervious 2 test cases but aditionally small amounts of energy on other modes show similar results.