ESTA Task2 - step1: First results on frequency comparisons
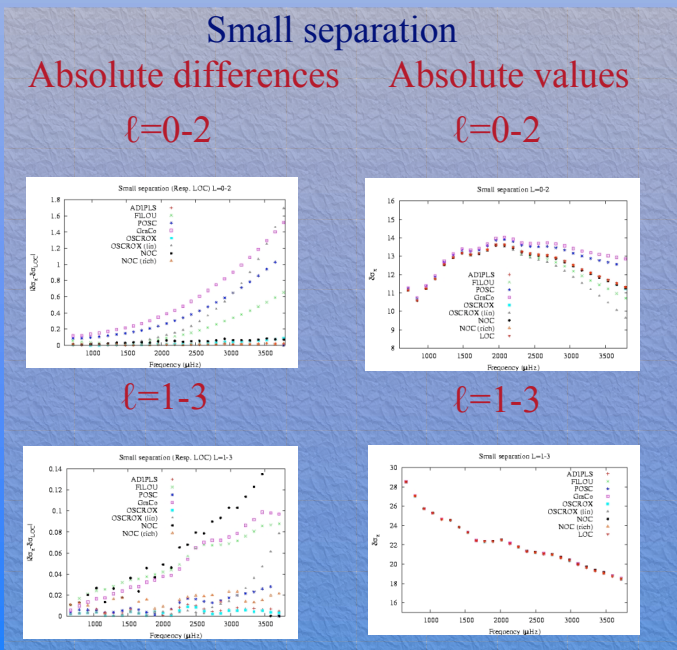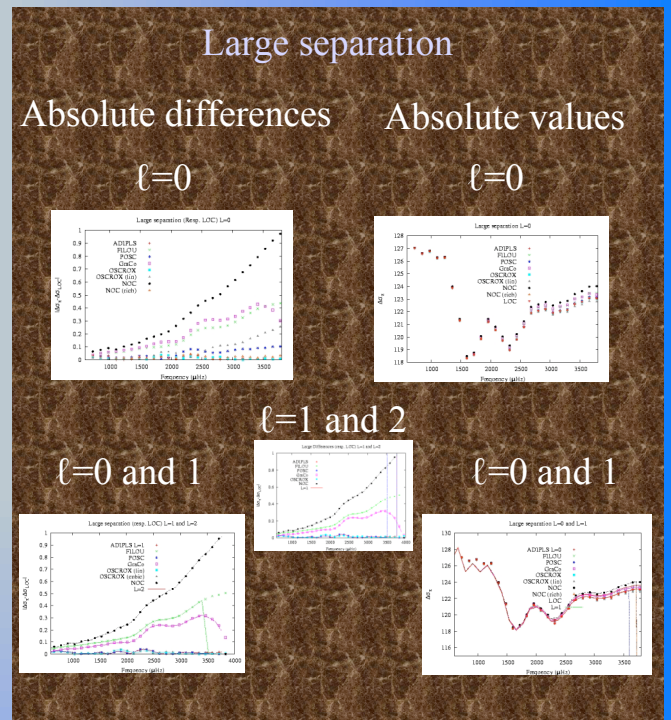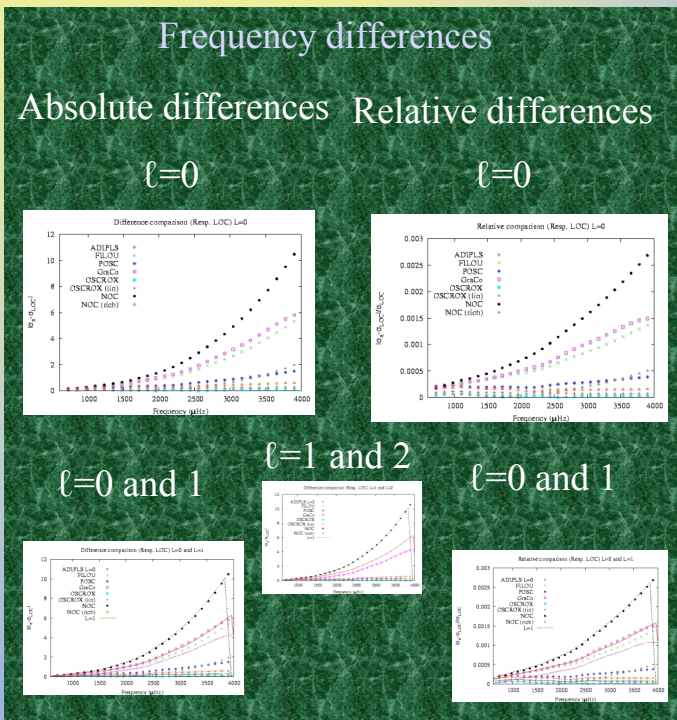
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Abstract

The fist step in the Task 2 of the ESTA Team is presented. From a fixed evolutionary model different format files have been constructed in order the different pulsational codes to be able to obtain a required frequency spectrum between [100,4000] μHz and $\ell=0, 1, 2$ and 3. The codes joined to this exercise are ADIPLS, POSC, FILOU, LOC, GraCo, OSCROX and NOC and comparisons between the frequencies themselves and the large and small separations are presented. As common requirement we impose the same outer boundary condition $\delta P(R)=0$. Some differences are founded depending on the frequency, ℓ and what we are comparing.

The equilibrium model

M/M$_\Theta$	log T$_{eff}$	log g	log L/L$_\Theta$	R/R$_\Theta$	X$_C$	Age (My)	Mesh points
1.2	3.800	4.399	0.250	1.146	0.69	96.7	902

Frequency differences

Absolute differences   Relative differences

$\ell=0$ $\ell=0$

$\ell=0$ and 1 $\ell=1$ and 2 $\ell=0$ and 1

Large separation

Absolute differences   Absolute values

$\ell=0$ $\ell=0$

$\ell=1$ and 2

$\ell=0$ and 1 $\ell=0$ and 1

Small separation

Absolute differences   Absolute values

$\ell=0-2$ $\ell=0-2$

$\ell=1-3$ $\ell=1-3$

Conclusions

	Frequency comparison		Large separation		Small separation	
	$\ell=0$	$\ell=1$	$\ell=0$	$\ell=1$	$\ell=0-2$	$\ell=1-3$
Absolute diff.	10	10	1	1	1.5	0.14
% diff.	0.25	0.25	0.8	0.8	16	0.7

Remarks and further work

1. Richardson extrapolation not used by all codes

2. We must use the same value of the gravity constant G

3. Is there any number of mesh points minimizing the differences? (maybe around 2000)

4. We must use the same boundary condition $\delta P(R)=0$

5. More information and contributions in:

http://www.astro.up.pt/corot/compfreqs/task2.html