

Numerical calculation of second order perturbations

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with Karim Malik, accepted by JCAP



$$\varphi = \varphi_0 + \delta\varphi_1 + \frac{1}{2}\delta\varphi_2$$

$$\delta\varphi_1'' + 2\mathcal{H}\delta\varphi_1' + k^2\delta\varphi_1 + a^2\mathcal{M}_1\delta\varphi_1 = 0$$

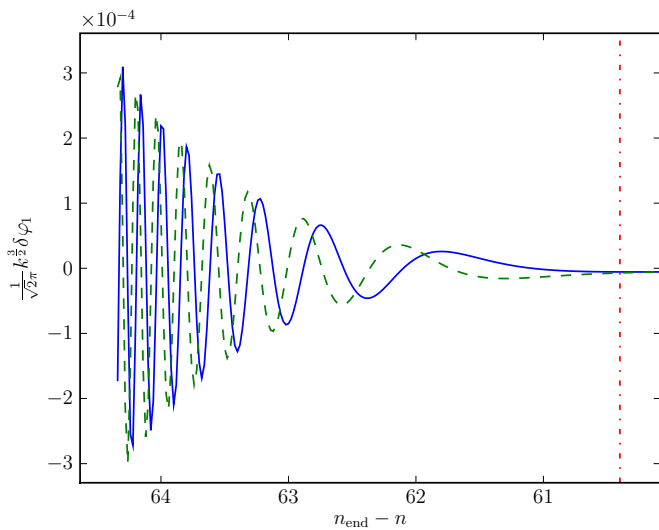
$$\delta\varphi_2'' + 2\mathcal{H}\delta\varphi_2' + k^2\delta\varphi_2 + a^2\mathcal{M}_2\delta\varphi_2 + S(\delta\varphi_1, \delta\varphi_1') = 0$$

Malik, JCAP 0703 (2007) 004, astro-ph/0610864.

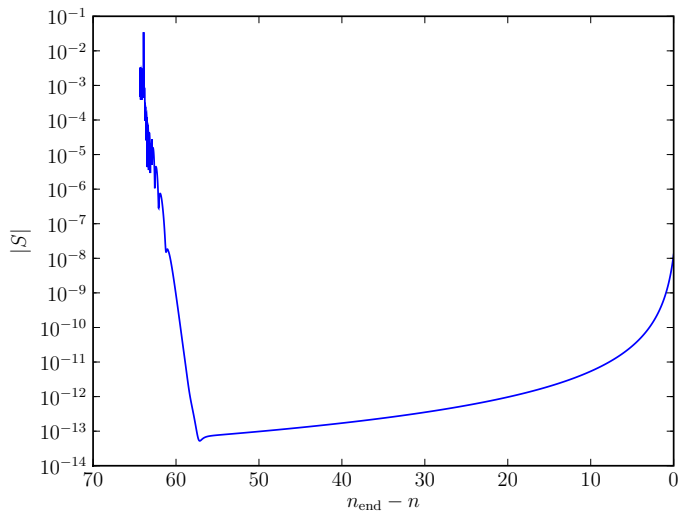
$$\int \delta\varphi_1(q^i)\delta\varphi_1(k^i - q^i)d^3q$$

code () :

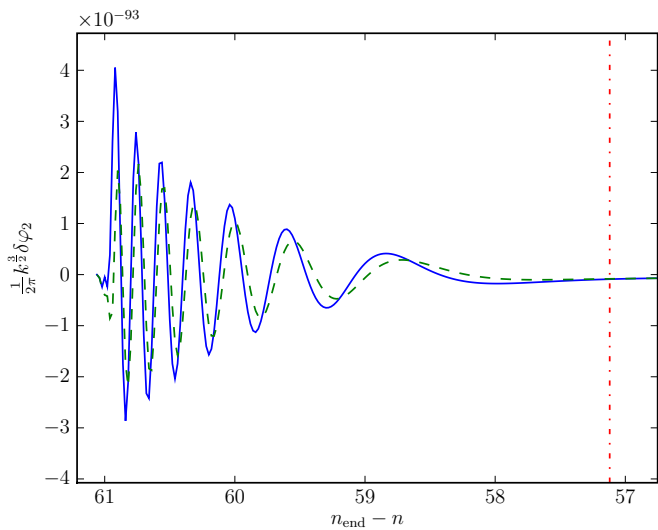
Following Salopek *et al.* (1989), Martin & Ringeval (2006)



First order



Source term



Second order

v1.0:

1000+ k modes

Slow roll source term

Parallelisable

- Need to go beyond 1st order
- Convolution required
- Next steps: full eqn, multi-field
- arXiv: 0907.2917