Department of Physics
University of Paderborn

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Exercise

Computational Optoelectronics and Photonics

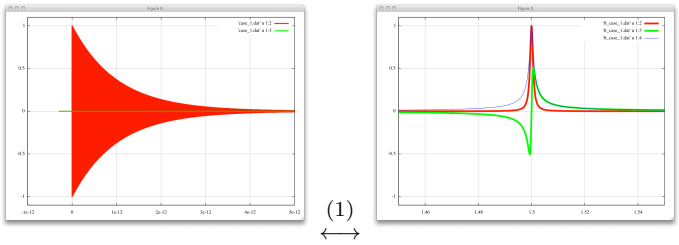
Dr. M. Reichelt SS 2016

PROBLEM SHEET VI

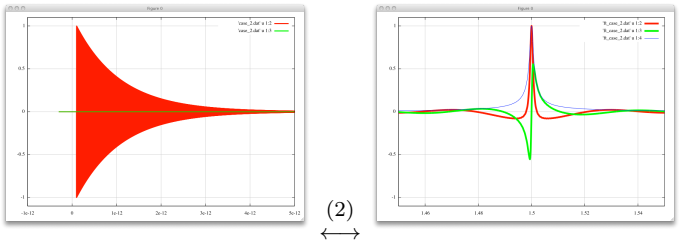
Please prepare by next exercise.

7. **Gauging**

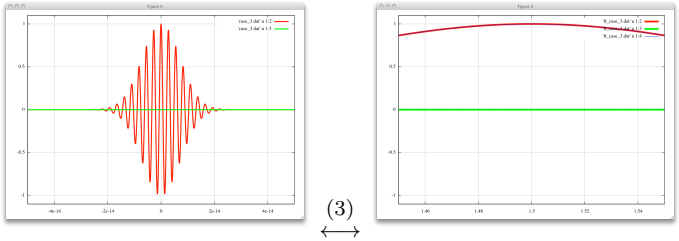
As we will proceed with a new topic soon, it is important that your code produces the correct results for the exercises of the sheets I-V. Run the following four test cases:



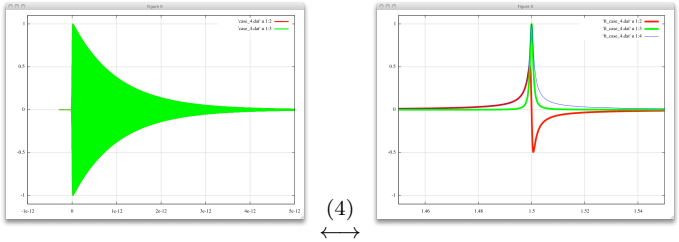
(1) ⟷



(2) ⟷



(3) ⟷



(4) ⟷

The figures display the (normalized) time signals in the left column and the (normalized) spectra in the right column. According data files **testcases.zip** can be download from:

`http://homepages.uni-paderborn.de/mreich/teaching.html`

The four cases are:

(a)

$$p(t) = \Theta(t) \exp(-\gamma_p t) \cos(\omega_L t) \tag{10}$$

(b)

$$p(t) = \Theta(t - t_0) \exp(-\gamma_p t) \cos(\omega_L t) \tag{11}$$

(c)

$$p(t) = \exp\left(-\left(\frac{t}{\Delta t}\right)^2\right) \cos(\omega_L t) \tag{12}$$

(d) $p(t)$ determined via

$$\frac{\partial}{\partial t} p = -i\omega_R p + \frac{i}{\hbar}\mu E - \gamma_p p\,. \tag{13}$$

Explanations and parameters will be given in the lecture.

Exercise

Create the time signals and compare them to the input files. Then, perform a Fourier transformation and check the results again. Start with case 1 and do not proceed to case 2 unless the correct output is produced etc.