



Determination of the third- and fifth-order optical nonlinearities: the general case

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We compute the evolution of the intensity (I) and the phase (ϕ) of a beam propagating in a nonlinear (NL) isotropic medium exhibiting third- and fifth-order NL optical characteristics. All formulas are analytic, but the general case requires a numerical inversion by means of Newton's method. The solutions may differ if some coefficients vanish, so they are given in all cases up to the fifth-order nonlinearities. The analytical relations allow us to fit the experimental data using the recently introduced D 4 sigma-Z-scan method. Carbon disulfide is tested at 532 and 1,064 nm in the picosecond regime deducing NL coefficients related to third- and fifth-order optical susceptibilities.

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