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Treatment and interpretation of experimental data in applied spectroscopy

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Abstract

The paper describes current methods of treatment and interpretation of experimental data in applied spectroscopy. The issue is reduced to the solution of an inverse problem, which frequently proves to be an ill-posed problem of mathematical physics. To solve such problems one must use a priori information on the solution obtained by the experimenter (regularization of solution). The methods of solution of such one-dimensional and multidimensional problems as smoothing, differentiation (including fractional), allowance for instrument distortions, solution of Abel's and Radon's equations (emission tomography), reduction problems in plasma spectroscopy and atomic absorption, decomposition of analytical signals to elementary components (Lorentzian, Gaussian, exponential), determination of components in CARS--spectra are considered in unified terms. The efficiency of the suggested algorithms are demonstrated by a number of mathematical experiments.