Marquardt-Levenberg

The Marquardt-Levenberg method is a means of optimising parameters in a least squares fit. It is used in our FluoFit, SymPhoTime and a variety of other products (online-Fitting, FluoLib...).

Basically it works by examining how changes of a certain parameter affect the residuals trace, that means, it calculates a pointwise gradient of the residuals trace for each parameter. Marquard-Levenberg optimisation is fairly efficient and is regarded as state-of-the-art in least squares fitting.

Shortcomings

ML is cannot be applied to any fitting method other than least squares (at least not in a straight-forward manner). Especially for the SymPhoTime software this is a severe limitation, since least squares assumes that the experimental noise follows a Gaussian distribution. Especially in FLIM measurements as analysed by the SymPhoTime software the number of photons for a given decay may be very small, so the experimental noise behaves more like a poisson distribution. For analysis of poisson distributed data least squares is strictly speaking not applicable any more and has to be replaced by MLE fitting.

When running a MLE fit the SymPhoTime software abandons the ML-fitting and switches to a gradient search.

PicoQuant GmbH
Rudower Chaussee 29 (IGZ)
12489 Berlin
Germany

P +49-(0)30-1208820-89
F +49-(0)30-1208820-90
info@picoquant.com
www.picoquant.com