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.

Copyright of this document belongs to PicoQuant GmbH. No parts of it may be reproduced, translated or transferred to third parties without written permission of PicoQuant GmbH. All information given here is reliable to our best knowledge. However, no responsibility is assumed for possible inaccuraciesor omissions. Specifi cations and external appearances are subject to change without notice.

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