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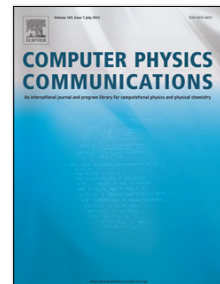
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# Least square fitting with one explicit parameter less

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## Abstract

It is shown that whenever the multiplicative normalization of a fitting function is not known, least square fitting by  $\chi^2$  minimization can be performed with one parameter less than usual by converting the normalization parameter into a function of the remaining parameters and the data.

## Program Summary

*Program title:* FITM1.

*Licensing provisions:* none.

*Programming language:* Fortran 77 with standard extensions (tested with g95 on a Mac).

*Operating systems:* Any with a Fortran 77 compatible compiler.

*RAM required to execute with typical data:* 1 Mbyte.

*Running time:* Less than 1 second on modern PCs.

*CPC Library Classification:* 4.9 Minimization and Fitting.

*Nature of the Problem:* Least square minimization when one of the free parameters is the multiplicative normalization of the fitting function.

*Solution method:* Conversion of the normalization constant into a function of the other parameters and the data, resulting into one explicit fitting parameter less.

*Key words:* Fitting, Curve Fitting, , Least Square Fitting,

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## 1. Introduction

The general situation of fitting by  $\chi^2$  minimization is that  $m$  data points  $y_i = y(x_i)$  with error bars  $\Delta y_i$  and a function  $y(x; a_j)$  with  $j = 1, \dots, n$  parameters are given and we want to minimize

$$\chi^2 = \sum_{i=1}^m \left( \frac{y(x_i; a_j) - y_i}{\Delta y_i} \right)^2 \quad (1)$$

with respect to the  $n$  parameters, where we neglect (as usual) fluctuations of the  $\Delta y_i$  error bars.

In many practical application one of the  $n$  pa-

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