

Mehring, Günther H.

Schöpf, Peter (ed.); Schwaiger, Jens (ed.)

[Prager, Wolfgang]

Nonlinear modelling, tutorial and manual. With an Appendix written by Wolfgang Prager and Jens Schwaiger. With CD-ROM. (English) Zbl 1104.65001

Grazer Math. Ber. 349, 1-115 (2005).

The aim of this booklet is to update ideas, algorithms and software on nonlinear modelling; it is a remake and a tribute paid to the author, Günther H. Mehring, by his fellows Peter Schöpf and Jens Schwaiger (Grazer Mathematische Berichte). The book contains a tutorial and a manual for the *NL* software. The tutorial on nonlinear modelling explains the *NL* basic ideas on nonlinear modelling, algorithms, and their correctness. Selected examples, prepared and annotated, support the theory and implementation results. The main fields considered are: evaluating functions, solving differential equations, fitting data, Fourier-analysis, used-defined libraries, statistical reference datasets.

The manual for nonlinear programming describes the main characteristics of the *NL* program package devoted to the analysis of nonlinear models. There are presented the *NL* features, requirements, hands-on instructions for how to apply the *NL* program to specific problems of nonlinear modeling: numerics, equation systems, parameters, the *NL* output etc. Computational methods (integration and Fourier coefficients, statistics, multivariate models) are outlined. The appendix shows (with enclosed screenshots) how the *NL* program can be used step-by-step. The attached CD contains the software and the original plain text files on which the book contents was developed.

Reviewer: [Neculai Curteanu \(Iași\)](#)

MSC:

- 65-01 Introductory exposition (textbooks, tutorial papers, etc.) pertaining to numerical analysis
- 90C30 Nonlinear programming
- 00A71 General theory of mathematical modeling
- 65Y15 Packaged methods for numerical algorithms
- 65L05 Numerical methods for initial value problems involving ordinary differential equations
- 65D10 Numerical smoothing, curve fitting
- 65T40 Numerical methods for trigonometric approximation and interpolation
- 65C60 Computational problems in statistics (MSC2010)
- 65K05 Numerical mathematical programming methods

Keywords:

algorithms software; nonlinear modelling; *NL* software package; evaluating functions; solving differential equations; fitting data; Fourier analysis; textbook

Software:

NL