Multivariate data fitting with error control

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We show how a newly developed multivariate data fitting technique enables to solve a variety of scientific computing problems in:

- filtering,
- queueing,
- networks,
- metamodelling,
- computational finance,
- computer graphics,
- antenna design,

and more.

We can capture linear as well as nonlinear phenomena because we use a generalized multivariate rational model.

The technique is a refinement of the basic ideas developed in [1] and interpolates interval data. Intervals allow to take the inherent data error in measurements and simulation into consideration, whilst guaranteeing an upper bound on the tolerated range of uncertainty. The latter is the main difference with a least squares technique which does as well as it can, but without respecting an imposed threshold on the approximation error. In applications where industry standards need to be guaranteed, the interval interpolation technique may be a valuable alternative.

References

[1] O. Salazar Celis, A. Cuyt, and B. Verdonk. Rational approximation of vertical segments. *Numerical Algorithms*, 45:375–388, August 2007.