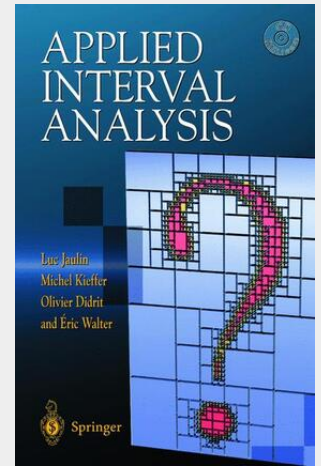


Applied Interval Analysis

With Examples in Parameter and State Estimation, Robust Control and Robotics

At the core of many engineering problems is the solution of sets of equations and inequalities, and the optimization of cost functions. Unfortunately, except in special cases, such as when a set of equations is linear in its unknowns or when a convex cost function has to be minimized under convex constraints, the results obtained by conventional numerical methods are only local and cannot be guaranteed. This means, for example, that the actual global minimum of a cost function may not be reached, or that some global minimizers of this cost function may escape detection. By contrast, interval analysis makes it possible to obtain guaranteed approximations of the set of all the actual solutions of the problem being considered. This, together with the lack of books presenting interval techniques in such a way that they could become part of any engineering numerical tool kit, motivated the writing of this book. The adventure started in 1991 with the preparation by Luc Jaulin of his PhD thesis, under Eric Walter's supervision. It continued with their joint supervision of Olivier Didrit's and Michel Kieffer's PhD theses. More than two years ago, when we presented our book project to Springer, we naively thought that redaction would be a simple matter, given what had already been achieved.

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