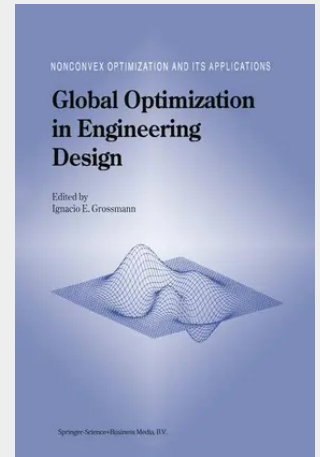


Global Optimization in Engineering Design

Mathematical Programming has been of significant interest and relevance in engineering, an area that is very rich in challenging optimization problems. In particular, many design and operational problems give rise to nonlinear and mixed-integer nonlinear optimization problems whose modeling and solution is often nontrivial. Furthermore, with the increased computational power and development of advanced analysis (e. g., process simulators, finite element packages) and modeling systems (e. g., GAMS, AMPL, SPEEDUP, ASCEND, gPROMS), the size and complexity of engineering optimization models is rapidly increasing. While the application of efficient local solvers (nonlinear programming algorithms) has become widespread, a major limitation is that there is often no guarantee that the solutions that are generated correspond to global optima. In some cases finding a local solution might be adequate, but in others it might mean incurring a significant cost penalty, or even worse, getting an incorrect solution to a physical problem. Thus, the need for finding global optima in engineering is a very real one. It is the purpose of this monograph to present recent developments of techniques and applications of deterministic approaches to global optimization in engineering. The present monograph is heavily represented by chemical engineers; and to a large extent this is no accident. The reason is that mathematical programming is an active and vibrant area of research in chemical engineering. This trend has existed for about 15 years.

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213,99 €

199,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9780792338819

Medium: Buch

ISBN: 978-0-7923-3881-9

Verlag: Springer

Erscheinungstermin: 29.02.1996

Sprache(n): Englisch

Auflage: Erscheinungsjahr 1996

Serie: Nonconvex Optimization and Its Applications

Produktform: Gebunden

Gewicht: 1620 g

Seiten: 388

Format (B x H): 160 x 241 mm

