

Large-Scale Systems: Modeling and Control

M. JAMSHIDI

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Given the complex, multidimensional nature of contemporary society, many real-life problems are 'large-scale' by nature, rather than by choice. The subject matter of 'large-scale' systems is a recently developed and increasingly important topic, and unfortunately, few monographs are available in which such issues are addressed. (For the interested reader, attention is drawn to the new journal "Large Scale Systems - Theory and Applications".) As many features of large-scale systems theory have been developed only recently, it is understandable that this topic has not been disseminated more widely. Jamshidi provides a timely pedagogic discussion of this important field and, by examining past, present and potential future trends, he gives scientists who are unfamiliar with these recent advances an opportunity to comprehend the subject through a balanced overview.

The overriding framework of the book is algorithmic: theoretical concepts are introduced, stated with proofs, and an algorithm is presented to illustrate how the results can be used. The large number of problems at the end of the chapters (including selected solutions) are particularly useful to permit a reader to progress soundly and individually. However, by the nature of the subject matter, many of the numerical examples require the use of a computer (although it is noted that the author would be willing to make available sources of appropriate BASIC programs and subroutines).

As the book's title suggests, attention focuses on modelling and control of large-scale systems. Large-scale, linear, continuous-time, stationary and deterministic systems are emphasized, but other classes of systems, such as non-linear, discrete-time, time-delay and stochastic large-scale systems, are also examined. With regard to modelling, two fundamental topics - regular and singular perturbation and aggregation - are discussed, and with regard to control strategies, particular attention is given to multilevel (hierarchical) and decentralized controls.

This is a difficult book but, as a clear, up-to-date survey, it deserves the attention of those dealing with large-scale systems. From this reviewer's experience, the large effort required is worthwhile, and there are numerous references given to enable a reader to take specific issues further. However, in terms of applicability, there remains a great need to give more consideration to the relationships between large-scale, physical systems and large-scale, control systems. Ultimately, our ability to say anything meaningful about today's problems requires an explicit examination of the relationships between the different levels of both these systems.

JOHN R. BEAUMONT

Progress in Nondifferentiable Optimisation

E.A. NURMINSKI (EDITOR)

IIASA, Austria, 1982. 257 + viii pp. U.S.\$14.00

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Nondifferentiable optimization is a promising research area. There are major problems to be overcome, and there is every likelihood that advances will also have relevance to differentiable optimization. Typical problems are finding the maximum of n functions, optimizing when piecewise linear