First of all a precaution: This is not a calculus book! As the author wrote, the term Multidimensional Analysis used here was chosen to emphasize the two distinct notions of dimensionality: dimensions in the physical sense, such as length, time, mass or charge, and dimensions in the mathematical sense, such as $m$-dimensional vector space or matrices of various sizes. The interplay between these two types of dimensionality is the central theme of the book.

The chapter by chapter description of the book is as follows: In the First Chapter the author introduces the so-called “dimensioned numbers”. In Chapters Two and Three this notion is extended to vectors and matrices. It is argued that the correct manipulation of dimensioned quantities should be done in the realm of dimensioned linear algebra as the results of the traditional linear algebra do not hold in the context of engineering applications. Chapter Four discusses singular value decomposition, matrix norms and structure of symmetric matrices from the above perspective.

Applications to systems theory are given in Chapter Five. Computational methods for representing and manipulating dimensioned quantities along appropriate software are covered in Chapter Six. It is claimed that the so-called dimensional logarithm provides an unified computational approach for numerical analysis. Finally, Chapter Seven is devoted to the issue how the traditional field of dimensional analysis can be generalized in the vector and matrix situation. The last two Chapters contain concluding remarks and solutions to odd-numbered exercises which appear at end of every chapter.

As the book is addressed to physicists, engineers, economists and scientists in a broad sense, who are using linear algebra and linear systems theory in the multidimensional setting, the potential reader will find here a consistent and clear exposition of basic ideas and applications which meet their needs. To the more mathematically minded readers the book offers interesting structures and concepts that deserve generalization.

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MSC:

00A73 Dimensional analysis (MSC2010)
93-01 Introductory exposition (textbooks, tutorial papers, etc.) pertaining to systems and control theory
93B25 Algebraic methods

Keywords:
dimensioned scalars; vectors and matrices; dimensioned numbers; dimensioned linear algebra; dimensional logarithm