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Arangala, Crista

Exploring linear algebra. Labs and projects with Mathematica.

Textbooks in Mathematics. Boca Raton, FL: CRC Press (ISBN 978-1-4822-4149-5/hbk). xi, 139 p. (2015).

The presented book provides readers with a set of interesting exercises and problems regarding linear algebra. The book covers the scope of an undergraduate course: matrices and their properties, inner product and vector spaces, orthogonality and matrix decompositions. Only the basic theorems are presented but not commented, the stress is put upon practice. Each theme is illustrated on various examples, so that the importance of the individual topics is clearly exhibited. Some of the examples may be more familiar to students of electrical engineering, e.g., data analysis or image compression, but in general the selection of examples is independent of any subject field. The last chapter is devoted to applications to (ordinary) differential equations; the linear algebra techniques are applied to the solution of simple differential systems and to the assessment of the stability of the obtained solutions. The complete text is based on computer experiments, which are performed in the computational environment of Mathematica. No preliminary knowledge of the Mathematica language is necessary: first, the book contains a gentle introduction to the necessary commands and second, only a very limited subset of the Mathematica language is used throughout the book. Almost no programming skills are requested from the reader. Instead, the author provides many links to codes, which are already prepared at the Wolfram demonstration web pages. Two minor issues should be mentioned. Although the book contains only very few misprints, the readability would have been better if typesetting of the Mathematica code had followed the standard appearance of the Mathematica notebooks (monospaced fonts, indenting, etc.). The second issue is slightly worse: almost all images are unclear with all edges blurred. This effect appears when screenshots are stored as loss compressed JPEG images. Such a typographic flaw appears in many papers nowadays, but definitely it should not be present in a printed book. Reviewer's remark: The book can serve as an excellent supplementary material for a linear algebra course, however, the course has to be adjusted to match the selected topics covered by the presented exercises. It is necessary to agree with a review on the Amazon web page, where the book is criticised for the lack of a complete set of solutions. Without any personal guidance the reader could grope for the relations between individual theorems and topics. From this point of view I would like to encourage the author to publish also a theoretical textbook matching this "Labs and projects". As the author's style is easily readable and the choice of the example problems is very interesting, the combination with an appropriate textbook would have become an exceptionally helpful resource for the students. *Cyril Fischer (Praha)*

Classification: H65 N35 N85
Keywords: linear algebra; exercises; undergraduate course; textbook; matrices; inner product; vector space; matrix decomposition; data analysis; image compression; ordinary differential equation; stability; computer experiment