

Title	My favorite
Sub Title	
Author	
Publisher	Faculty of Science and Technology, Keio University
Publication year	2009
Jtitle	New Kyurizukai No.2 (2009. ) ,p.7- 7
JaLC DOI	
Abstract	
Notes	
Genre	Article
URL	<a href="https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO50001003-00000002-0007">https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO50001003-00000002-0007</a>

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# 私の My favorite books 本棚



## ● Robust Optimization -In English

This is the first textbook on robust optimization, the research field I'm now most interested in. It was published only recently, in August 2009, by several authors including the author who proposed the robust optimization method in 1998. In a little over ten years since this method was first introduced, this field of study has developed so remarkably it has become a voluminous textbook like this. By reading and incorporating it, I intend to achieve significant research results in this field.

## ● Global Optimization -In English

This book is the first imported book in English which I read to help my research pursuit in the second year of my master's course. In those days this book was not available at the Keio Library, so I borrowed it from the library of a nearby university. The book is a memorable one for me as I read it intently, carrying it around in my hand at all times. "Global Optimization" introduces a variety of methods to solve highly complex optimization problems strictly. It is often the case that attempts to express realistic problems properly in numerical formulas result in extremely difficult optimization problems. Usually some compromise is made (for example, by giving up expressing certain phenomena in numerical formulas) to simplify problems for easy solution. However, there are cases where such compromise cannot be made and problems become difficult. In such cases, the global optimization method is employed to strictly solve the problems, which is a time-consuming process. Currently studies on global optimization are not pursued widely since it targets problems that are too difficult to handle. Given the increasingly higher performance capabilities of computers, the time may come before long when these problems can be solved in a realistic period of time.

## ● Measurement and Improvement of Operating Efficiency -In Japanese

This is a textbook on the Data Envelopment Analysis (DEA), one of the methods of operations research. It is difficult to measure operating efficiency of public enterprises such as hospitals and libraries because evaluation criteria also include factors other than "profit."

The DEA method was proposed as a tool of relative evaluation, targeting business entities with a number of evaluation criteria such as "profit" and "the number of users". This method enables problem awareness to be easily understood while also allowing the problems to be formulated in an easy-to-solve manner. As an easily accessible research field, DEA can be recommended for students learning OR as a suitable theme for their graduation or master's thesis. Speaking of myself, I chose a DEA-related theme for my master's thesis. As I proceeded with the thesis, I became interested in thinking about "How to better solve formulated problems", which led to the theme of my doctor's thesis. Students, if you are in trouble looking for the theme of your graduation thesis, try reading this book. It may give you a clue!

## ● Solving Criminal Cases with Mathematics -Translated in Japanese

This book explains mathematical background for the American TV drama "NUMB3RS" (also being aired on a cable TV channel in Japan). In this drama, an FBI investigator (elder brother) and a genius mathematician/professor (younger brother) join forces to solve a number of difficult cases with mathematics playing a key role for solutions. For instance, a cash-transporting vehicle is attacked by robbers at the opening of a program. Then the genius mathematician appears to explain the shortest path problem and its algorithm. He advises saying, "If this method is applied, the robbers' escape route should be this! You should lie in ambush at this point" and impressively solves the case. In this TV drama, "mathematics" is introduced in the form of OR and statistical methods. As a viewer, I'm often impressed with the way mathematics is practically applied. While mathematical methods used in the drama are explained briefly due to time limitations, my attention tends to be attracted to numerical formulas written down on the blackboard and I wonder "Is that particular formula from such-and-such method?" In such cases I read this book for confirmation. Even when I do not view the drama, this book can be fully enjoyed as I can find that mathematical methods taught at the university can be useful in so many practical scenes.

## ● Useful Linear Equation -In Japanese

This book is being widely advertised by Amazon and other media as "the book describing a dramatic turnaround and revival of 'integer programming' that had long been regarded useless, as a useful method." In retrospect of the past four decades, the book describes in an interesting way in which integer programming and other optimization methods have developed to this day, together with the breakthrough research works and profiles of major scientists. Prof. H. Konno, the author, is a fantastic person as he has not only written many technical books in the optimization field so far but also can write a more popular book like this that can be enjoyed by the general public. I was surprised at the book's wide range of readers when a student once approached me and wanted to join my laboratory saying, "I became interested in OR as a high school student when I happened to read Prof. Konno's book."