David M. Himmelblau (1923-2011)

David M. Himmelblau was a leader in the introduction of computing into chemical engineering since the 1960s. He authored outstanding textbooks in material and energy balances, process simulation, statistical analysis, and optimization that utilize computer-based problem solving techniques, and performed pioneering research in these same areas. He also provided leadership in AIChE, ASEE, and CACHE to facilitate national efforts for computer-based education.

WARNING

THE SURGEON GENERAL HAS DETERMINED THAT LISTENING TO THIS TALK COULD DISRUPT YOUR SOBER BUSINESS SENSE AND LEAD TO LONG-TERM CAREER DAMAGE.

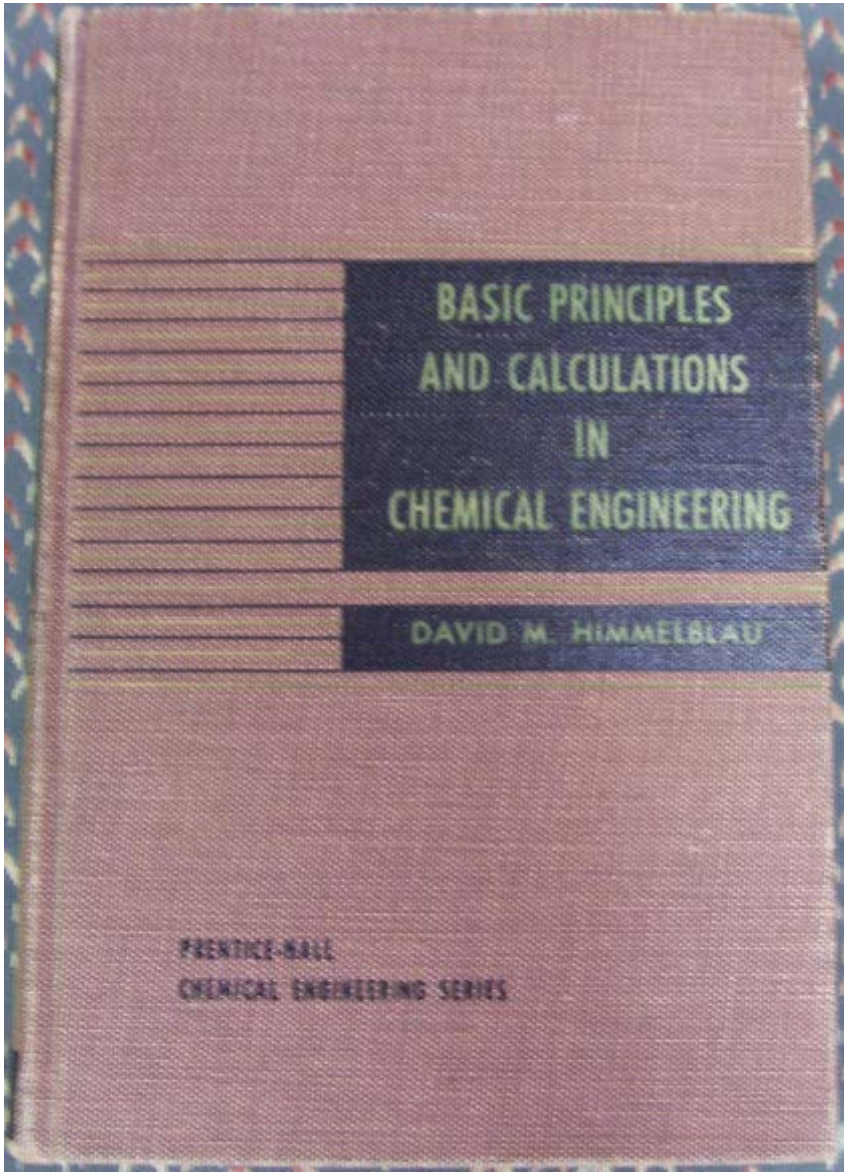
Career Milestones

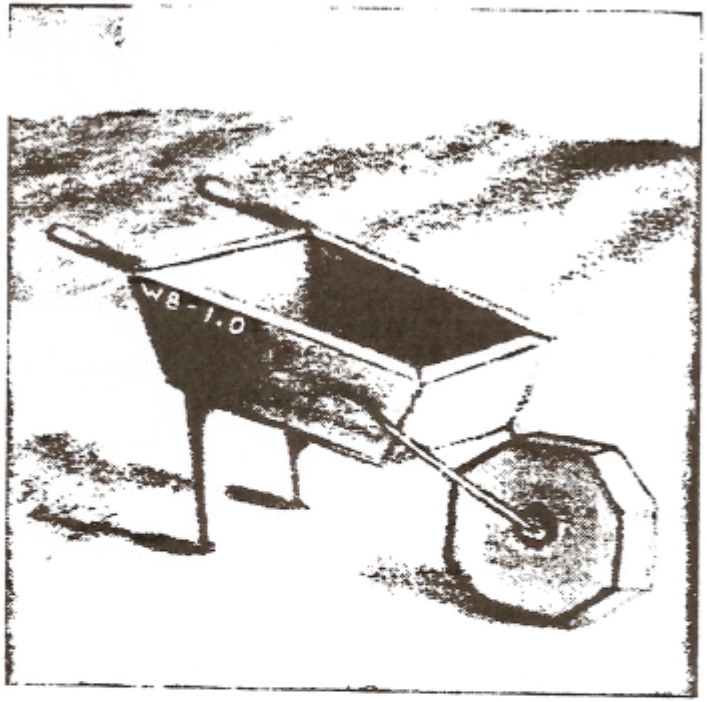
- B.S (1947) MIT
- Ph.D. (1952) U. Washington – Seattle
- Worked three years in industry
- Assistant professor at UT-Austin (1957)
- Emeritus Professor (1997)

Basic Principles and Calculations in Chemical Engineering

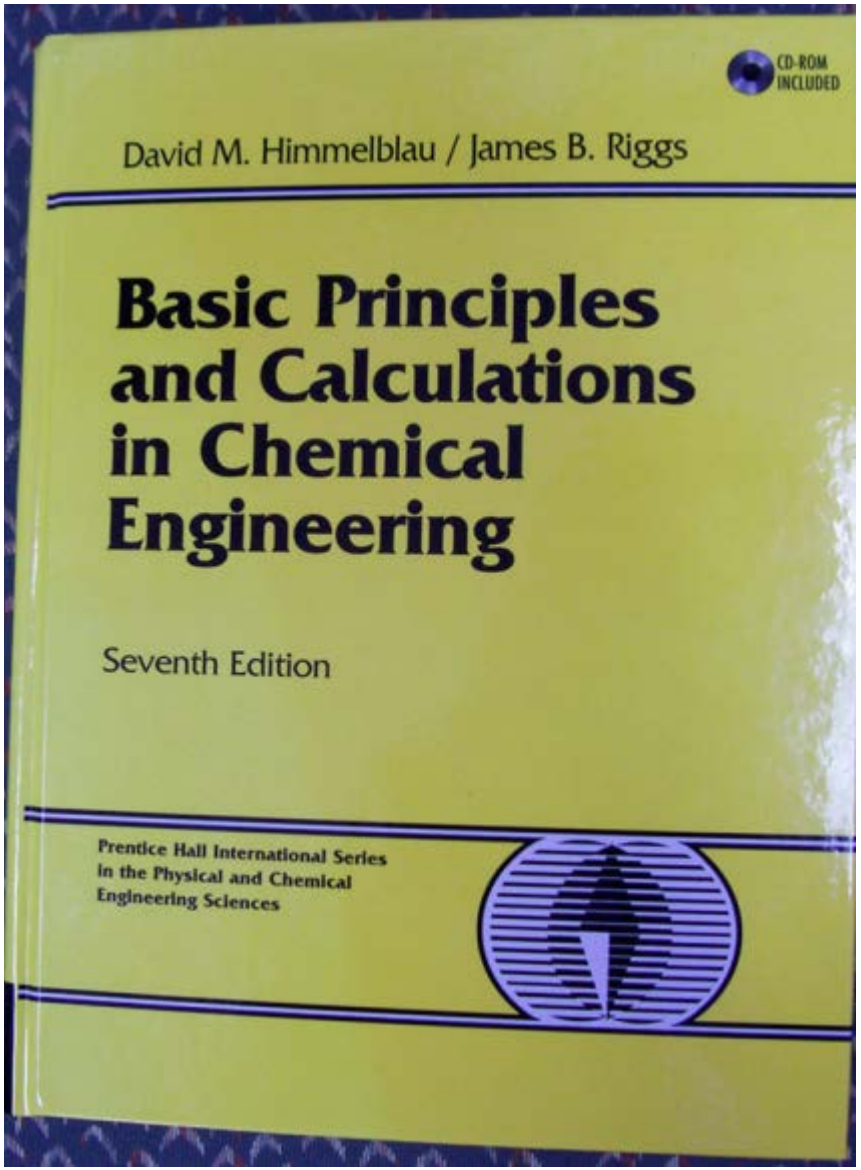
(1st ed., 1962; … 7th ed., 2004; 8th ed., ?)

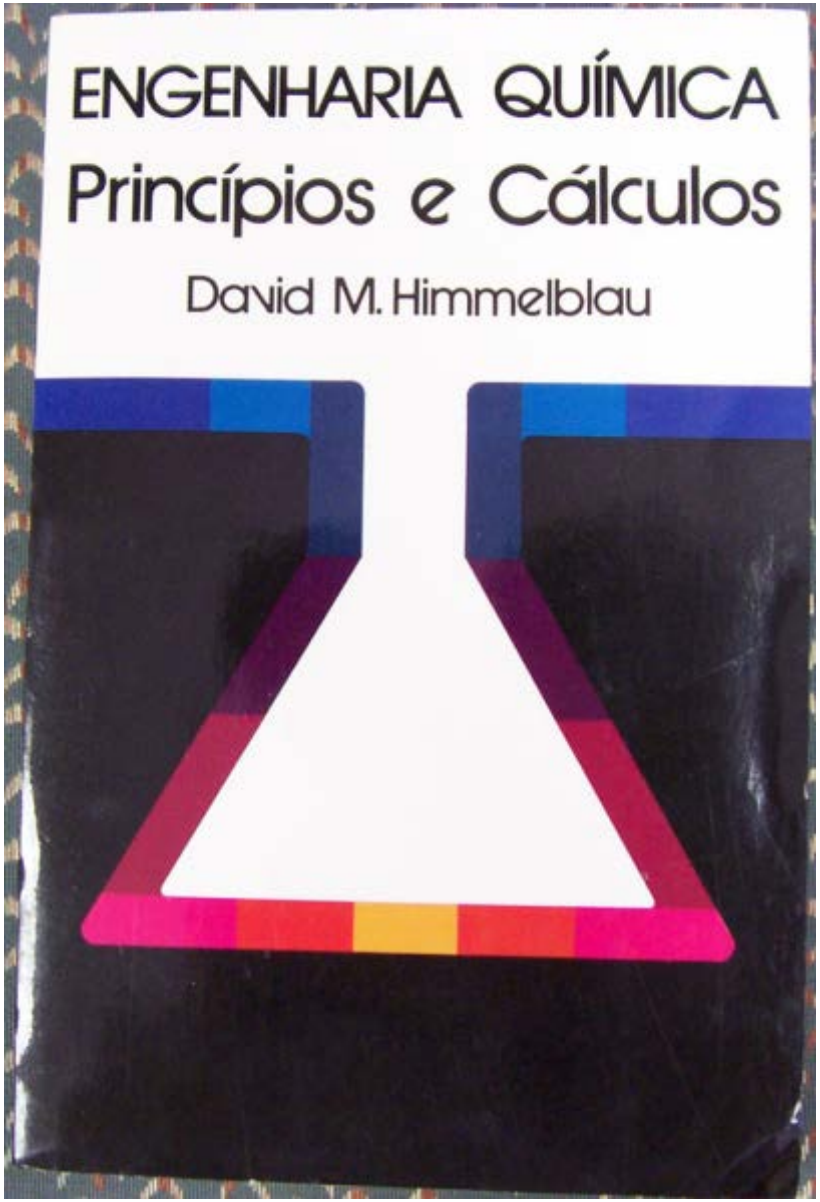
- Translated into Japanese and Spanish
- 1974 (3rd ed.) – introduced computer-based problems and homework solutions
- 1989 (5th ed.) – introduced process flowsheeting codes for simultaneous mass/energy balances
- 1996 (6th ed.) – CD included numerical methods software and estimation of physical properties
- 2004 (7th ed.) – with J.B. Riggs (Texas Tech) - covers wide range of chemical engineering technology, added POLYMATH



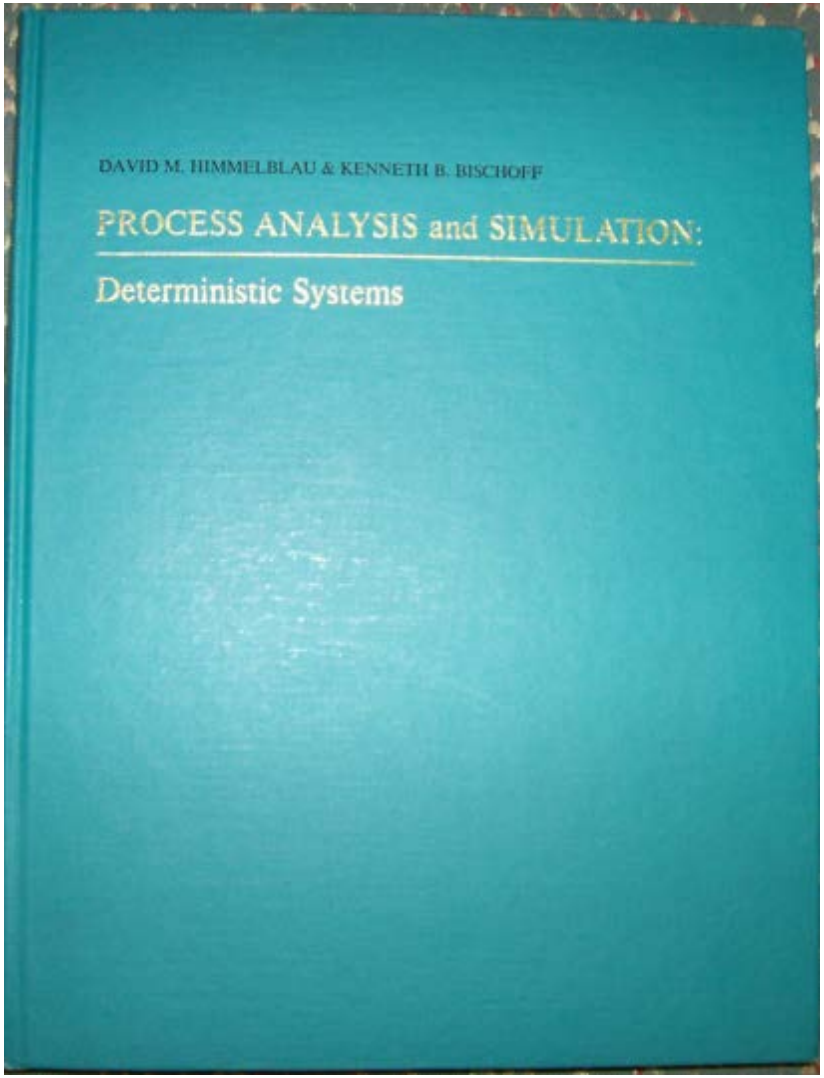


THE CURSE OF THE LOW SERIAL NUMBER


CD-ROM INCLUDED
David M. Himmelblau / James B. Riggs
Basic Principles and Calculations in Chemical Engineering
Seventh Edition
Prentice Hall International Series in the Physical and Chemical Engineering Sciences

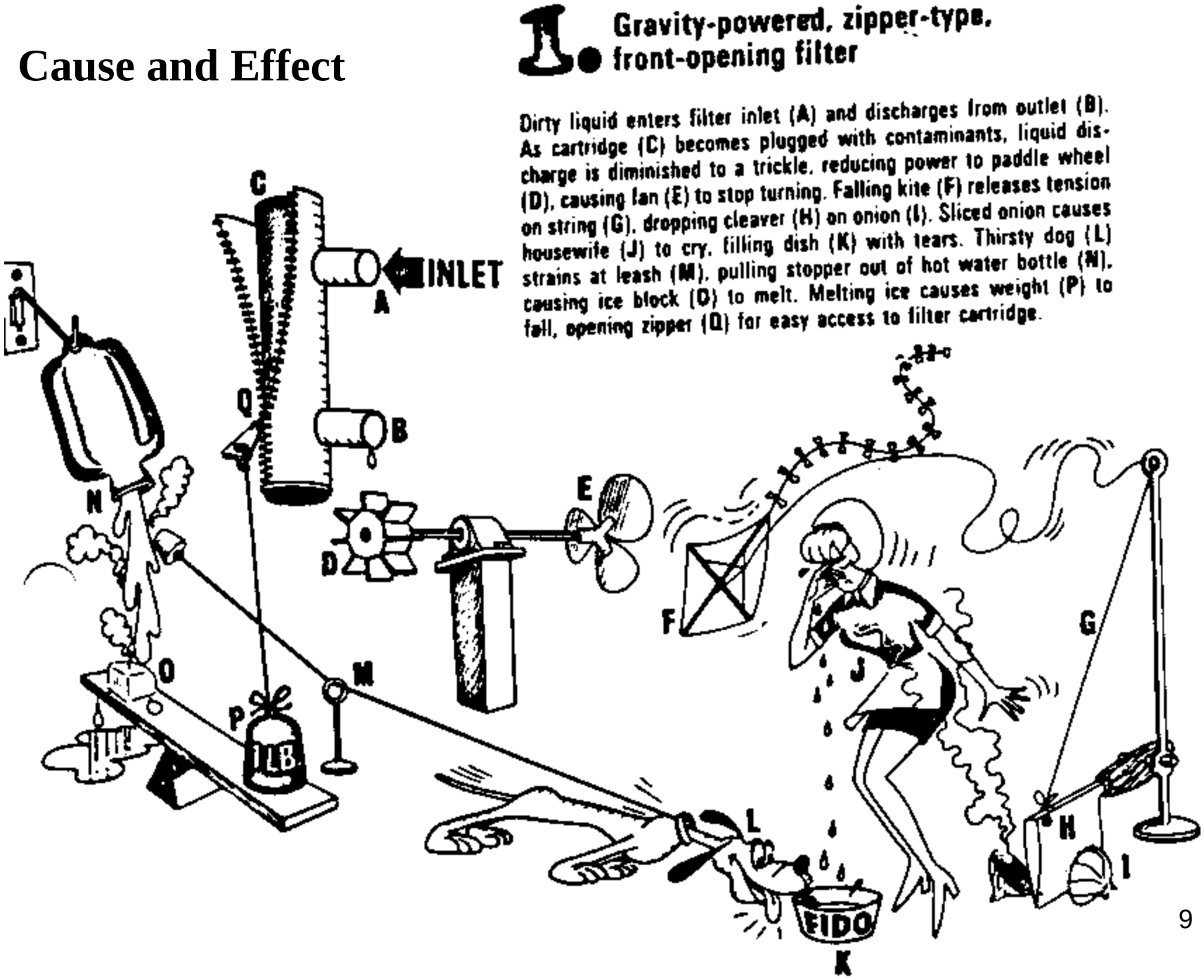

ENGENHARIA QUÍMICA
Princípios e Cálculos
David M. Himmelblau

Process Analysis and Simulation
Himmelblau and Bischoff (1968)

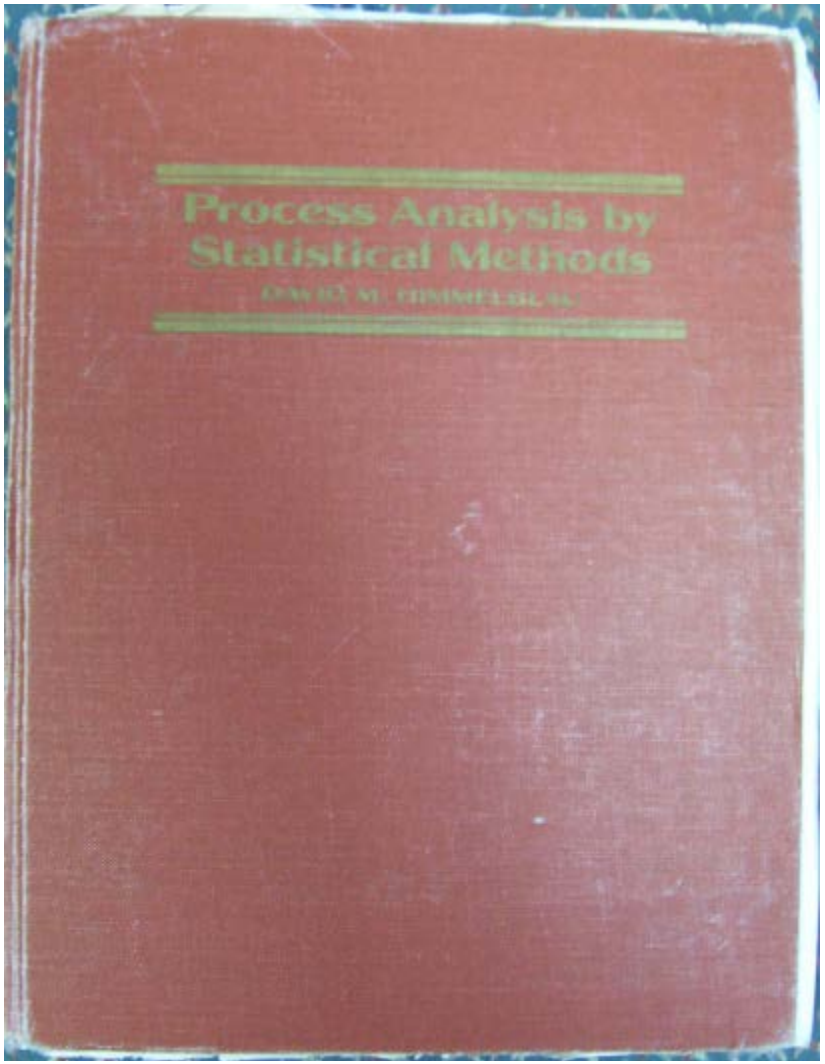


- First book on deterministic process modeling
- Chapters on population balance models, system stability
- Homework exercises required computer solution

Cause and Effect

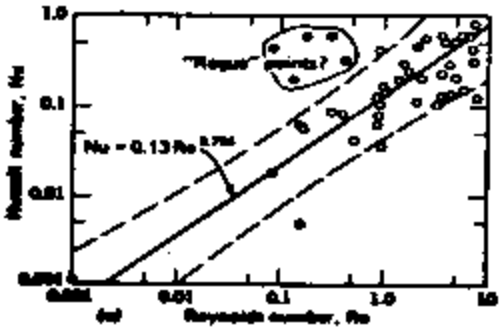


Process Analysis by Statistical Methods (1970)



- Truly pioneering book for chemical engineers
- Design of experiments
- Methods of estimating model coefficients for data
- Included extensive treatment of mathematical and computing tools

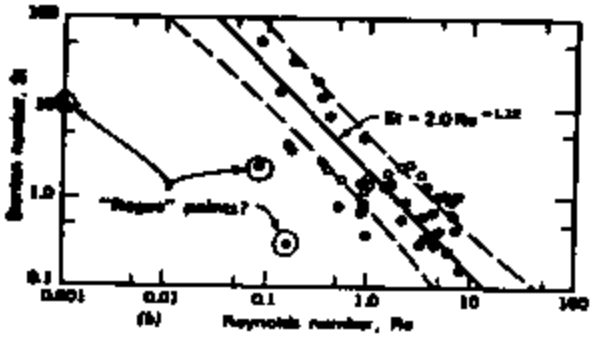
NUSSELT NUMBER--REYNOLDS NUMBER CORRELATION



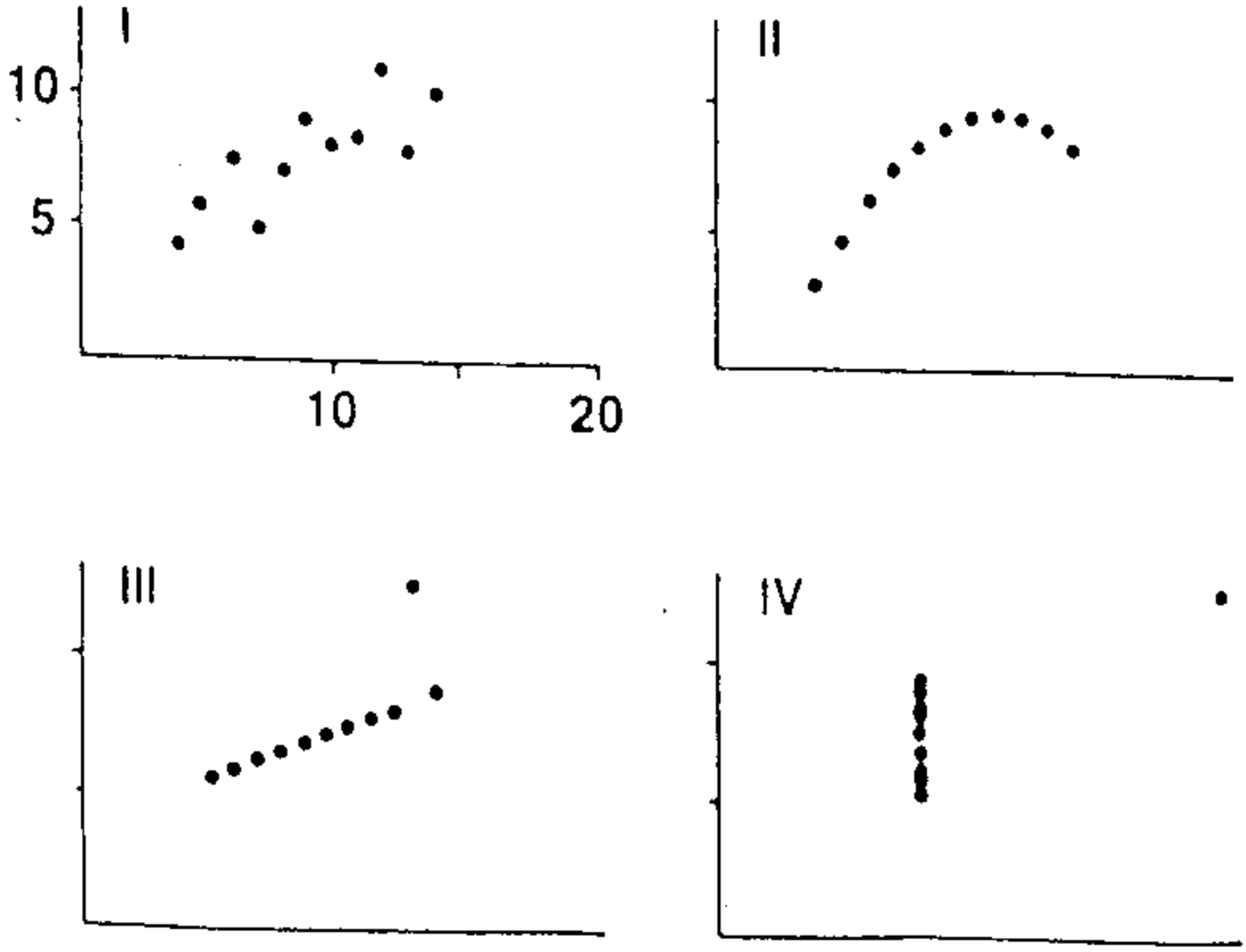
?

$$\frac{hD}{k} = 0.13\left(\frac{vDe}{\mu}\right)^{.8}$$

STANTON NUMBER--REYNOLDS NUMBER CORRELATION



$$\frac{h}{c_p v \rho} = 2.0\left(\frac{vDe}{\mu}\right)^{-1.12}$$


I
10
5
10
20
II
III
IV

Some Quotes about Modeling and Computing

- All models are wrong but some are useful.
- It is much easier to prove a model wrong than prove it right.
- It is better for a model to be approximately right than exactly wrong.
- A model should be as simple as possible but no simpler.

"A Starbucks will open on your block."

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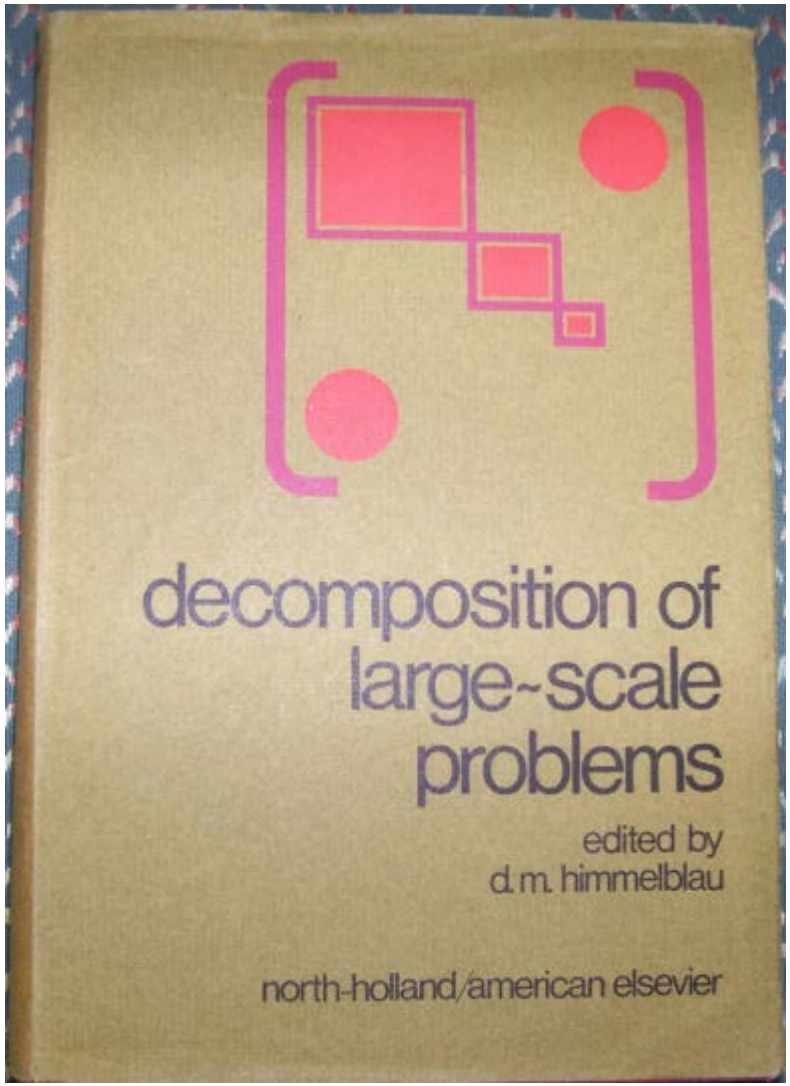
Pedagogical Advances

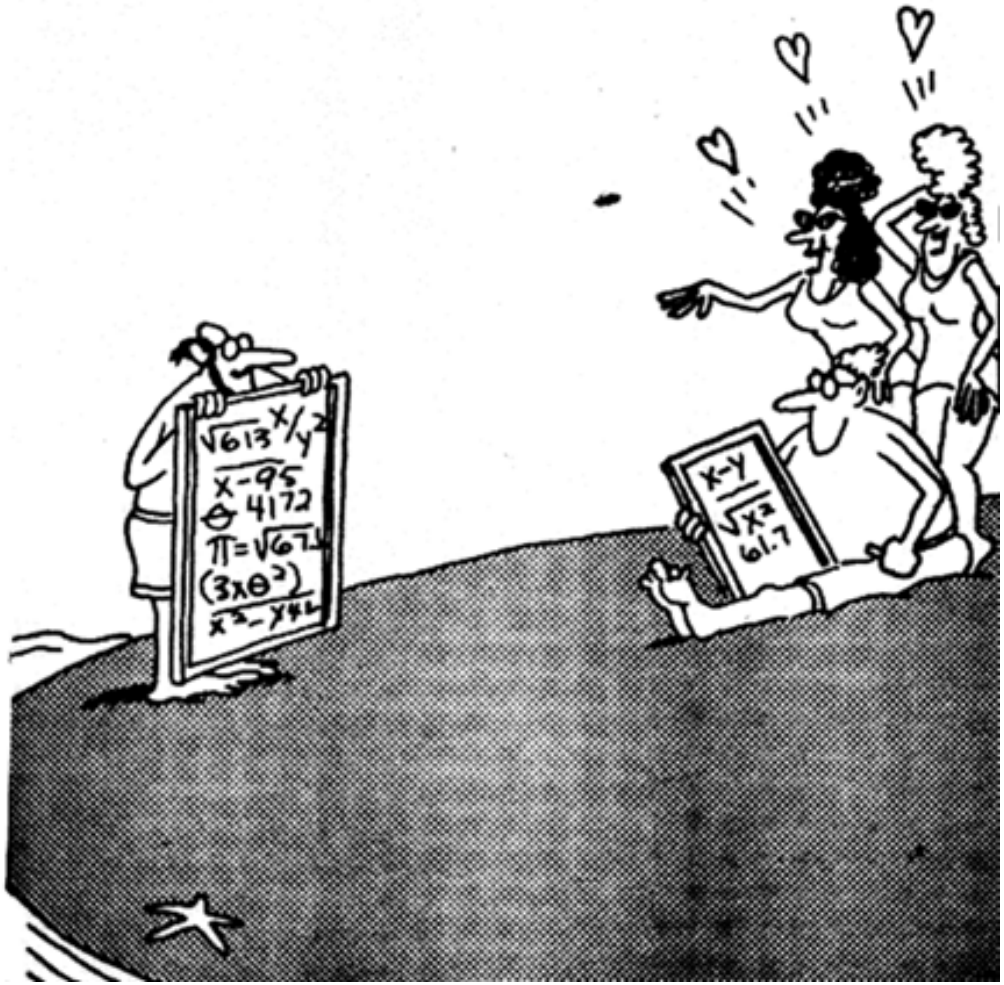
- Developed self-paced courses dealing with FORTRAN programming and advanced statistical analysis at UT-Austin in the 1970s, presaging current efforts in distance education courses.
- Interactive computer programs were an essential part of his statistics course even before computers were easily accessible to students.

Other Books (Co-Authored)

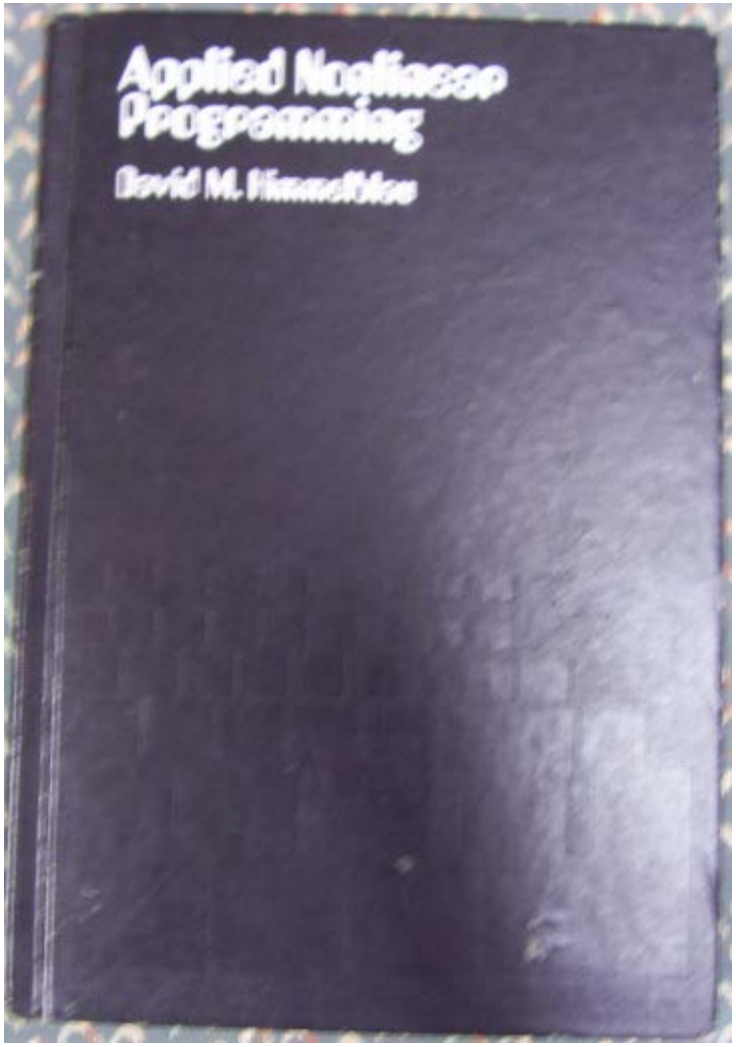


- Adventures in Fortran Programming
- Optimal Expansion of a Water Resources System
- Decomposition of Large Scale Problems

The Lure of Advanced Computing

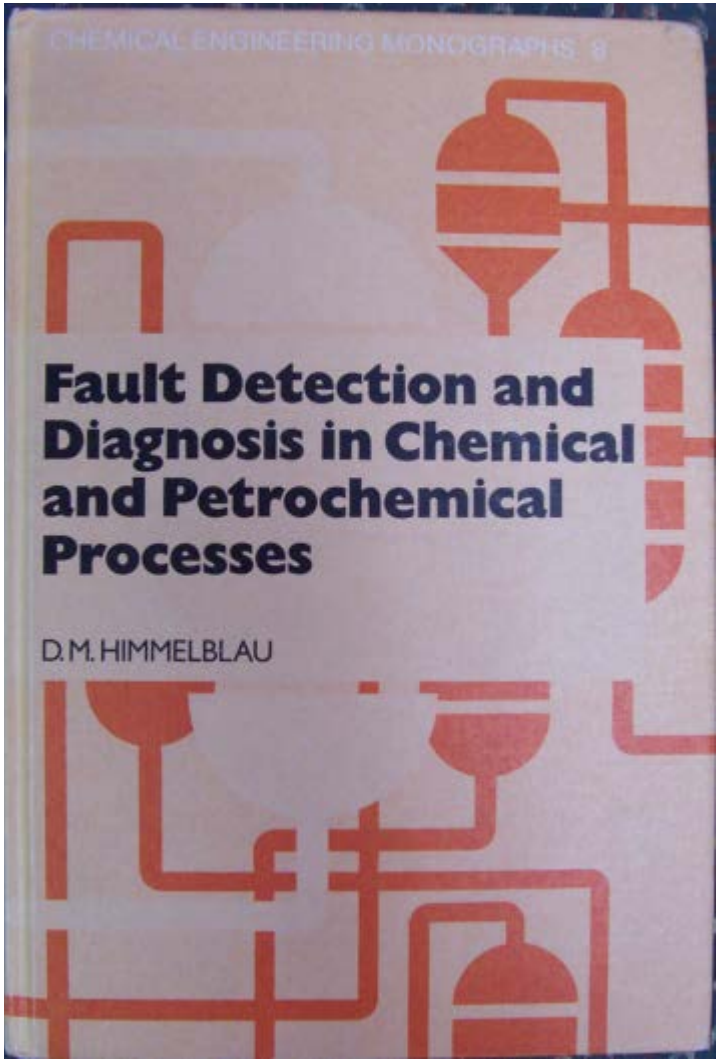


Applied Nonlinear Programming (1972)



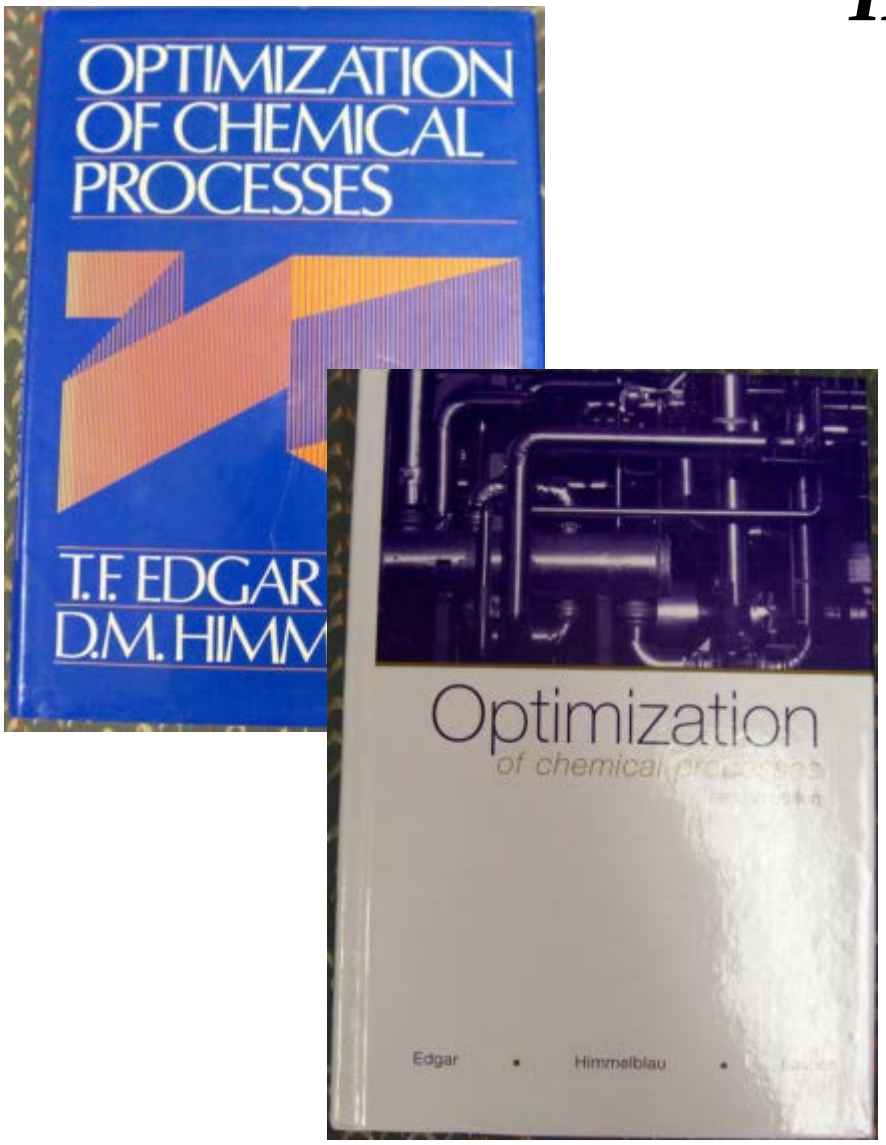
- First Ch.E. book in this field
- Included performance comparisons of NLP codes
- Introduced clear exposition of quasi-Newton methods

Fault Detection and Diagnosis in Chemical and Petrochemical Processes (1979)



- Came out of DMH's research emphasis in this area
- Led to subsequent research on neural nets

Optimization of Chemical Processes, McGraw-Hill



- 1st ed: Edgar and Himmelblau (1988)
- 2nd ed: Edgar, Himmelblau and Lasdon (2001)
- Emphasized the use of modern software tools
- Identified the best algorithms (vs. encyclopedic coverage of all algorithms)
- Covered many ChE applications of optimization

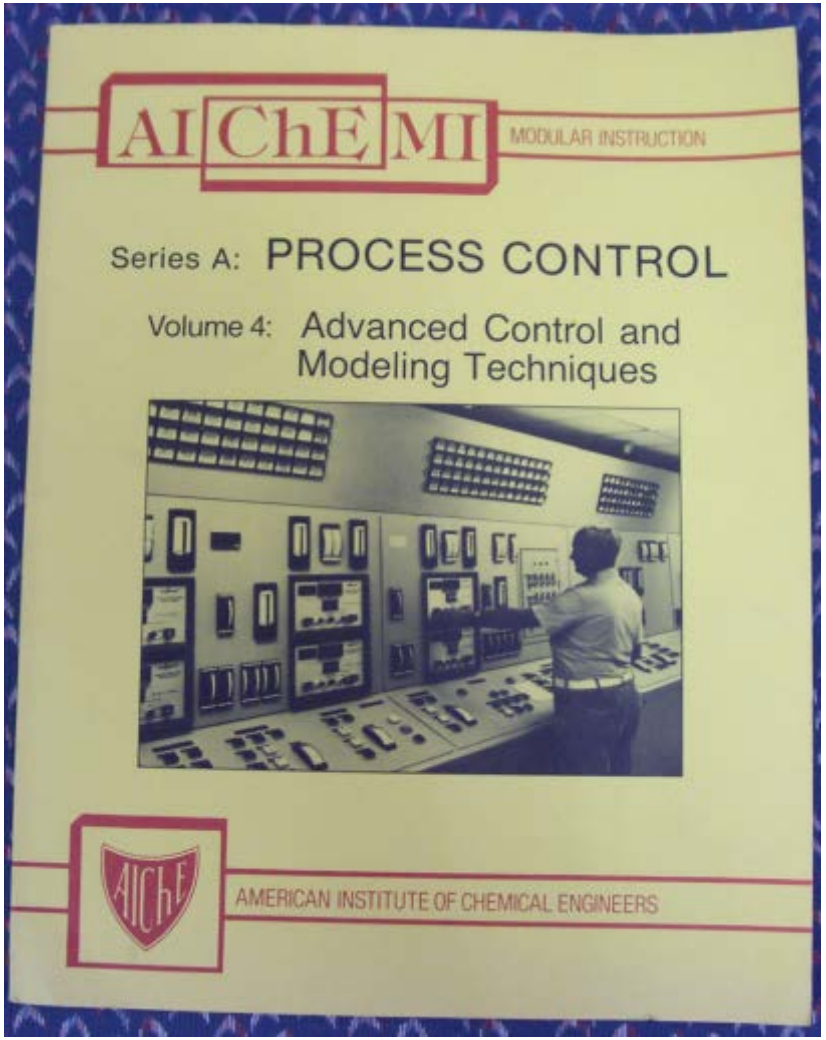
COMPUTING MYTHS

1. USE OF COMPUTERS ALWAYS MAKES YOUR WORK EASIER
2. COMPUTERS WILL RESULT IN A “PAPERLESS” OFFICE
3. “100% COMPATIBILITY”
4. “USER-FRIENDLY”

Glen Johnson, Dean at Tennessee Tech

"Before I went into the Dean business, my research interests included nonlinear programming. That's the basic area in which I did my doctoral work (ME Systems), and I taught graduate courses in the field at Vanderbilt, Michigan, and Dayton when I was on the faculty of those institutions. As a graduate student, I really liked David Himmelblau's first NLP book because of its clarity of presentation on different algorithms. I used his later book with Edgar when I taught the introductory graduate course."

From 1970 – 2000, David Himmelblau was a leader within CACHE

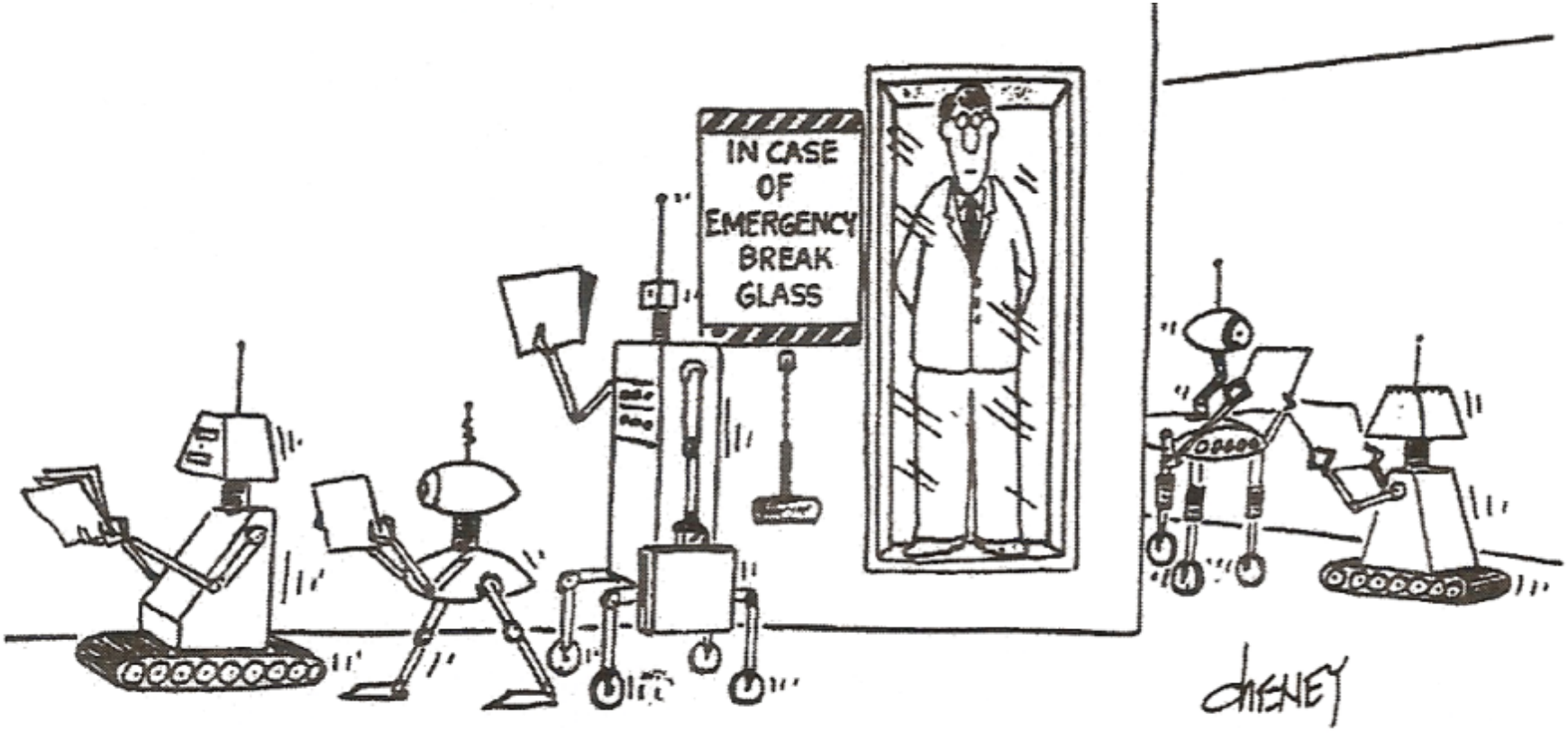


- PI for NSF AIChEMI project (250 modules – 7 core courses from 100's of faculty worldwide)
- Served 16 years as CACHE Executive Officer
- Edited CACHE News

Dave’s Successor as Executive Director?

Himmelblau's Research

- In 1988 (with Josiah Hoskins) published the first paper in the area of chemical engineering describing the potential of artificial neural networks.
- The inventor of one of the principal penalty function methods for NLP (with Newell), which is still used today. For example, one of the DuPont plants used it for supervisory control of a train of chemical reactors.
- Developed one of the key methods of estimating parameters in nonlinear differential equations.


IN CASE
OF
EMERGENCY
BREAK
GLASS
CHENEY

Professional Activities/Awards

- CAST Division Director, Vice-Chair, Chair (1979-82)
- CAST Division Award (1986)
- Original Editor of ChE Faculties Directory (AIChE) (1960-70)
- Chair/Vice Chair of AIChE Student Chapter, Membership Committees, AIChE Director
- ASEE Joe Martin Award (1987)
- AIChE Founders Award (1992)
- ASEE CACHE Award (2005)

"As someone who worked closely with David on bookwriting, I know first-hand his attention to detail, his unrelenting quest for clarity and brevity in writing, his detailed and often unmerciful critiques of co-author drafts, and his very high standards for textbook materials."

Tom Edgar

Jim Riggs

"I have known David for 40 years in a variety of capacities. I took my first chemical engineering course from David in 1965 using, of course, the first edition of his landmark book. I took two other undergraduate courses from him, including his course on process simulation. During my MS studies at UT, I consulted with him on optimization approaches and he provided me with state-of-the-art optimization software that I used for completion of my MS research. After I moved to Texas Tech in 1983, I would regularly visit with David to discuss research and textbook authoring. And in 2001, David invited me to co-author the Seventh Edition of *Basic Principles and Calculation in Chemical Engineering*."

Brice Carnahan

"David's seminal research contributions, particularly in process analysis, nonlinear programming, parameter estimation and fault-detection have been driven by strong interests in solving real-world chemical engineering problems with computational tools. His greatest international influence has been as a prolific chemical engineering textbook author and coauthor. Few chemical engineering educators (I can't think of any) have authored so many influential high-quality textbooks."

Jeff Kantor

“I was deeply saddened by news of David's passing. David was one of the great individuals of our profession. Like many graduate students in the 1970's, my first encounter with David was through his early landmark papers on flowsheet structure and computations. Those papers were remarkable for their novelty and their especially clear elucidation of his ideas. But it wasn't until a few years later during a visit to Austin that I came to appreciate the full breadth of his contributions to scholarship and to the profession. He was always constructive, unselfishly offering helpful advice and thoughtful reflection. Whatever he had to say, it was delivered with a unique blend of scholarly precision and personal grace. He contributed enormously to the profession through his work on behalf of CACHE, AIChE, his own scholarship, and the development of a wide range of teaching materials.”

Bob Seader

“I was very saddened to hear of the passing away of Dave Himmelblau. He was a giant in our profession. When I decided to run for Director of AIChE, told me what I needed to do it to win the election. He was a tireless worker for CACHE, donating more of his time to make CACHE successful than we will ever know. When CACHE was struggling financially to make ends meet, he came up with ideas that saved CACHE. He was an inspiration to many, including myself. I always had the utmost respect for him and felt very fortunate to be associated with him.”

Larry Biegler

“It was sad to hear of David's passing, and it is a sad occasion for the chemical engineering community. David was a leading figure in computer aided process engineering. He developed and pioneered many of the topics, including computer-based modeling and simulation, nonlinear optimization, data handling and fault detection, that have become important and widely used components of our field. I am grateful that David provided me with support, advice and encouragement ever since I started in academia. I will especially cherish my opportunities to work with him on CACHE matters, where his commitment, organization, strong ethical standards and dry wit made a strong impression on me. David was a gentleman and a scholar.”

Venkat Venkatasubramanian

"I am indeed very sad to learn the passing away of Professor David Himmelblau, even though I was aware of his deteriorating health in recent years. As a pioneer in process fault detection and diagnosis, David was a mentor to me in this area. His book on this topic was and still is an important resource to approach this subject. As I got started doing research in this area in 1985 at Columbia University, David was very encouraging and supportive of my methods which had a huge impact on me. He was always there in the front row at the AIChE sessions during our presentations, asking important questions or making a tastefully crafted humorous remark. As I served in CACHE, I got to know David some more. He was a classy gentleman -- warm, thoughtful, generous, kind and with a keen sense of dry wit. I started missing him in the sessions as his health did not permit him to attend AIChE meetings in recent years and I shall miss him even more now. But I will never forget David for all his contributions to our profession as well as to me personally."

Ignacio Grossmann

“I was sorry to hear that David Himmelblau passed away. I first knew about David through his textbook "Basic Principles and Calculations in Chemical Engineering" when I was an undergraduate in Mexico City. That textbook had a positive impact on me as it taught me how to do systematic analysis on chemical engineering problems. I still have the copy of that text in my bookshelf. I met David at my first AIChE meeting in Philadelphia in 1978 and very much liked him because he came across to me as a kind person despite his strong reputation as a leader in the profession. Subsequently, at the CACHE meetings, when David was Executive Director, I got to know him quite well and enjoyed discussing with him research in optimization. Above all, however, I enjoyed his marvelous sense of humor.”

Manfred Morari

“I was very much saddened by David's passing. While I first learned of him as a graduate student through his publications and especially his book on optimization, I got to know him personally through CACHE. His help was invaluable when Tom McAvoy and I organized the Conference on Process Control CPC III in 1986. His efficient and non-bureaucratic approach ensured a smooth operation. I vividly remember his after dinner lecture upon receiving the CAST award that same year. This mix of deep insights, philosophy of research and subtle humor was never surpassed. He has greatly impacted our profession in many ways.”

Bruce Finlayson

“I remember David Himmelblau as a true gentleman - always accessible and interested in what you were doing. His book for the first course in chemical engineering was the first one I taught from when I joined the University of Washington to begin my career. It was also the one we organized a self-paced course around. It was later that I learned he got his PhD here working with Professor Al Babb ('57). In 1995, when I was chair, it was my pleasure to introduce him to our students as a Distinguished Alumnus of the Department. His talk was an inspiration to students as well as faculty. Dan Schwartz, currently our chair, said "As an assistant prof., I recall thinking what an honor it was to have a job in a dept. that produced people like him."

Scott Fogler

“I am so sorry to learn of David's passing. He was a friend and mentor to all the CACHE trustees as well as a multitude of others. In my case he was extremely supportive and encouraging as I started to develop the interactive computer games for chemical reaction engineering back in 1977. Dave was also a guiding light in CACHE through his role as Executive Director and a member of the executive committee for many years. I learned so much from David about teaching techniques, textbook writing and educational philosophies. He was a very important person in my professional life.”

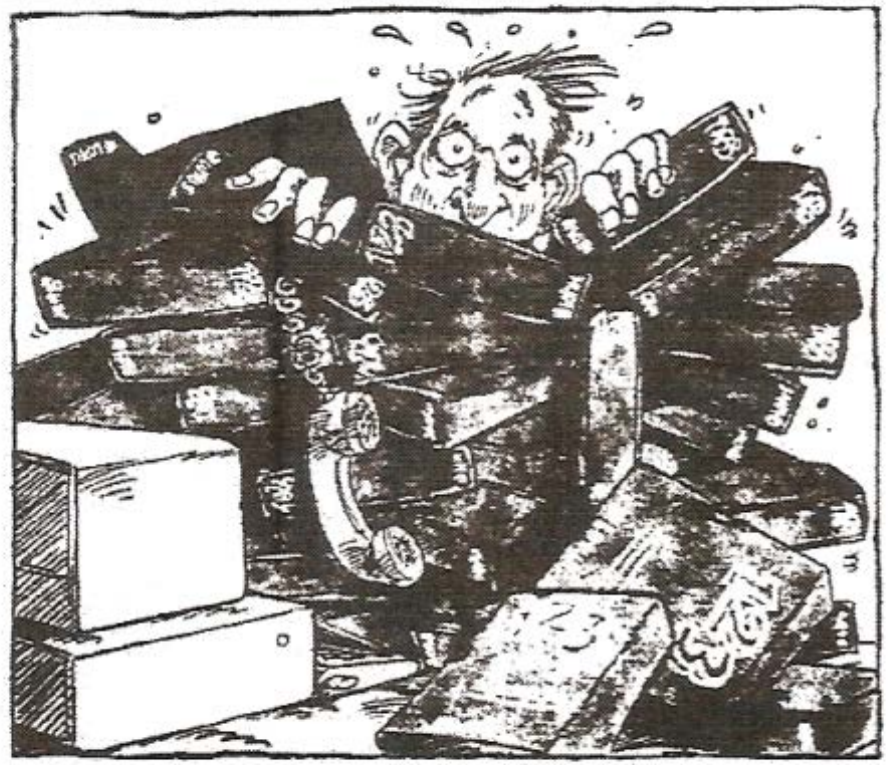
Jim Rawlings

“Cheryl and I are of course saddened by this news. I had Dave for a class when I was an undergrad, and he helped me find a summer job at a chemical plant in Houston. He and Betty were always very nice to Cheryl and me when we came back to UT to join the faculty. Dave always had a unique and interesting point of view when he served on my students' thesis committees, especially if random variables or statistics came into the discussion. I always enjoyed my time with Dave. He treated people well and had a wonderful sense of humor.”

Endowment of CAST Division Himmelblau Award

Bonnecaze
Chen
Carnahan
Congalidis
Cummings
Curtis
Edgar
Fan
Finlayson
Grossmann
Hahn
Henley
Himmelblau
Kim
Kofke
Koros
Liebman
McAvoy
Morari
Nellor
Park
Piovoso
Richards
Riggs
Rosen
Seader
Seider
Siirola
Stephanopoulos
Venkatasubramanian

Total $33,425



RECIPROCAL LAW OF COMPUTING

Old software never runs on a new system.

New software never runs on an old system.