THE GRADUATE SCHOOL
UNIVERSITY OF CONNECTICUT RESEARCH FOUNDATION
Biography, Bibliography and Professional Summary
of
Michael B. Cutlip, Professor
Department of Chemical Engineering

Revised: 5/11
Date of Appointment: 1968

Birthdate:	9/21/41	Birthplace: Portsmouth, Ohio
Education:	B.Ch.E.	1964 The Ohio State University
	M.S.	1964 The Ohio State University
	Ph.D.	1968 University of Colorado
Experience:	1961-63	Student Assistant, Mathematics Department The Ohio State University
	1962	Applications Engineer, Du Pont Film Department Wilmington, Delaware (Summer)
	1963	Research Engineer, Du Pont Plastics Department Wilmington, Delaware (Summer)
	1967-68	Post-Doctoral Research Associate, University of Colorado
	1968-	Assistant Professor, University of Connecticut Associate Professor, 1973-80
	1973	Assistant Project Engineer, Fuel Cell Analysis Group, Pratt and Whitney Aircraft, East Hartford, Connecticut (Summer)
	1973-74	Consultant, Pratt and Whitney Aircraft, Fuel Cells
	1974-75	Sabbatical Leave, Senior Visiting Fellow Department of Chemical Engineering, University of Cambridge, Cambridge, England (also summer 1976)
	1978-88	Consultant, Control Data Corporation
	1980-81	Consultant, United Technologies Corporation
	1980-89	Department Head, Chemical Engineering Department University of Connecticut
	1981-	Professor, University of Connecticut
	1982	Sabbatical Leave, Visiting Professor, Fall Semester, Department of Chemical Engineering, University of Michigan, Ann Arbor, Michigan
	1983	Sabbatical Leave, Senior Visiting Fellow, Department of Chemical Engineering, University of Cambridge, Cambridge, England (Jan.-Aug.)
	1989	Sabbatical Leave, Visiting Professor, Fall Semester Department of Chemical Engineering, University of Adelaide, Adelaide, South Australia
	1998-2001	Director, University Honors Programs, University of Connecticut
	2003	Emeritus Professor
	2003	Managing Director, Polymath Software, Willimantic, CT

Professional Societies:	American Institute of Chemical Engineers; American Chemical Society; American Association for Engineering Education, National Program Chair for CHEG Division 1998, Chair of CHEG Division 2000, Co-chair Summer School 2002; Association of Environmental Engineering Professors; American Association for Fuel Cells; Catalysis Society; Electrochemical Society; Tau Beta Pi; Phi Lambda Upsilon; Sigma Xi; Trustee of CACHE Corporation (Computer Aids for Chemical Engineering Education-a nonprofit corporation), 1981-, Secretary 1988-90, Vice President 1990-92, President 92-94.
Honors of Distinctions:	Senior Visiting Fellow, Science Research Council, United Kingdom, 1974-75, Summer 1976, and Jan.-Aug. 1983; Fellowship from the Japan Society for the Promotion of Science, 1990; Featured Chemical Engineering Educator, Chemical Engineering Education, **28**, 3, pp.160-163 (1993); Distinguished Alumni Award, College of Engineering and Applied Science, University of Colorado, 1995; David M. Himmelblau Award, Innovations in Computer-based Chemical Engineering Education, Computing and Systems Technology Division of the of the American Institute of Chemical Engineers, 2010.
Field of Specialization:	Chemical Engineering -- Catalysis, Chemical and Electrochemical Reaction Engineering; Environmental Engineering; Numerical Methods; Computer-Based Instruction.
Research Interests:	Steady State and Transient Studies of Heterogeneous Catalysis and Adsorption; Mathematical Models for Heterogeneous Catalysis and Fuel Cell Electrodes; Computer Applications and Computer-Based Instruction; Problem Solving Software

Books:

Cutlip, M. B. and M. Shacham, **Problem Solving in Chemical Engineering with Numerical Methods**, Prentice Hall, Upper Saddle River, NJ, 1998.

Cutlip, M. B. and M. Shacham, **Problem Solving in Chemical and Biochemical Engineering with POLYMATH, Excel, and MATLAB**, Second Edition, Prentice Hall, Upper Saddle River, NJ, 2008.

Patents:

Fenton, J. M, H. R. Kunz, M. B. Cutlip and Jung-Chou Lin, "Membranes, Membranes Electrode Assemblies and Fuel Cells Employing Same, and Process for Preparing," US 6,465,136 B1, October 15, 2002.

Journal Articles:

Cutlip, M. B. and M. S. Peters, "Heterogeneous Catalysis over and Organic Semi-conducting Polymer Made From Polyacrylonitrile." Chem. Engr. Prog. Symposium Series, 64, 1 (1968).
Bennett, C. O., M. B. Cutlip and C. C. Yang, "Transient Methods and Gradientless Reactors in Heterogeneous Catalysis." **Chem. Eng. Sci.**, **27**, 2255 (1972).

Cutlip, M. B. and G. M. Bhatt, "Effect of Surface Acidity on Alcohol Dehydration Catalysis by Pyrolyzed Polyacrylonitrile." **J. of Catalysis**, **26**, 272 (1972).

Cutlip, M. B., C. C. Yang and C. O. Bennett, "Parameter Estimation from Transient Rate Data". **AIChE Journal**, **18**, 1073 (1972).

Yang, C. C., M. B. Cutlip and C. O. Bennett, "A Study of Nitrous Oxide Decomposition on Nickel Oxide by a Dynamic Method." Proceedings of the Fifth International Congress on Catalysis, North Holland Publishing, Amsterdam (1973).

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Iczkowski, R. P. and M. B. Cutlip, "Voltage Losses in Fuel Cell Cathodes." **J. Electrochem. Soc.**, **127**, 1433 (1980).

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Herskowitz, M., R. Holiday, M. B. Cutlip and C. N. Kenney, "Effect of Metal Dispersion in CO Oxidation on Pt Supported Catalysts." **J. Catalysis**, **74**, 408 (1982).

Goodman, M. G., C. N. Kenney, W. Morton, M. B. Cutlip and D. Mukesh, "Transient Studies of Carbon Monoxide Oxidation over Platinum Catalyst." **Surface Sci.**, **120** (2), L453 (1982).

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Shacham, M., N. Brauner, W. R. Ashurst, and M. B. Cutlip, "Can I Trust This Software Package? An Exercise In Validation of Computational Results," **Chem. Eng. Educ**., 42 (1), 53-59(2008).

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Cutlip, M. B. and M. Shacham, "POLYMATH – the Present, the New DIPPR Database Option and the Future of This Popular CACHE Numerical Problem-Solving Package," Paper 388b, AIChE Annual Meeting, Nashville, TN, Nov. 8-13, 2010.

Willey, R. J., H. S. Fogler and M. B. Cutlip, "Kinetic Analysis of the Runaway Reaction Using Diglyme As a Solvent (the T2 Incident)," 3rd Center for Chemical Process Safety, Latin American Conference and Exposition, Buenos Aires, Argentina, Aug. 8-10, 2011.

Educational Publications

Computer-Based Educational Materials Published by the Control Data Corporation on the PLATO Educational Computer System (with M. Shacham)

Plato Numerical Computation Package

1. Polynomial, Linear and Nonlinear Curve Fitting Program (1982)
2. Simultaneous Linear and Nonlinear Algebraic Equation Solver (1982)
3. Simultaneous Ordinary Differential Equation Simulator (1982)
4. Multiple Linear and Nonlinear Regression Program (1984)
5. Library Entry to the Computational Package (1984)

Introduction to Chemical Reaction Engineering

This computer-based course was developed with M. Shacham with the support of Control Data Corporation. It is self-paced and utilizes mastery learning. The student chooses learning activities from a programmed learning textbook, computer tutorials, advanced simulators, computer generated tests and problems. Approximately 50 terminal hours are required.

POLYMATH for the Control Data 110- Released 1984
(Coauthored with M. Shacham)

The initial version of POLYMATH incorporates most of the features of the Plato Numerical Computation Package (Items 1-4 indicated above) plus a calculator. This package is commercially available from Control Data for exclusive use on the CD 110 microcomputer. Detailed user manual is provided.

POLYMATH for the IBM PC and Compatibles Version 1.0 - Released October 1984
(Coauthored with M. Shacham)

This version of POLYMATH incorporates and extends the features of the first version for the CD 110. It consists of four separate disks each having a detailed user guide with extended examples. Polymath is designed to be extremely friendly, and no programming language is required for use. It is menu driven and utilizes extensive graphics. The Version 1.0 programs include:

-Polynomial, Linear and Nonlinear Curve Fitting Program
-Simultaneous Linear and Nonlinear Algebraic Equations Solver
-Simultaneous Linear and Nonlinear Ordinary Differential Equation Simulator
-Multiple Variable Linear Regression Program

POLYMATH for the IBM PC and Compatibles Version 2.0 - Released April 1987
(Coauthored with M. Shacham)

This version of POLYMATH incorporates significant enhancements and an additional library capability to the Version 1.0. Additionally a new program called the Matrix Manipulator allows the use of spread sheet type commands to define and manipulate vectors and matrices. The library capability enables all programs to be stored on disk for later retrieval or modification.

Cutlip, M. B., "User Manual for the Polymath Polynomial, Linear and Nonlinear Curve Fitting Program", 60 pages (1987).

Cutlip, M. B., "User Manual for the Polymath Simultaneous Linear and Nonlinear Algebraic Equation Solver." 64 pages (1987).

Cutlip, M. B., "User Manual for the Polymath Simultaneous Linear and Nonlinear Ordinary Differential Equation Simulator.", 62 pages (1987).

Cutlip, M. B., "User Manual for the Polymath Multiple Variable Linear Regression Program.", 58 pages (1987).

Cutlip, M. B., "User Manual for the Polymath Matrix Manipulator.", 68 pages (1987).

POLYMATH for the IBM PC and Compatibles Version 2.1 - Released August 1990
(Coauthored with M. Shacham)

A new manual has been prepared for this updated version which is made available to Chemical Engineering Departments, faculty and students by the CACHE Corporation.

Cutlip, M. B. and M. Shacham, "POLYMATH User-friendly Numerical Analysis Programs", 76 pages (1990).

POLYMATH for the IBM PC and Compatibles Version 2.1.1 - Released July 1992
(Coauthored with M. Shacham)

Software and manual updated (1992) for distribution by the CACHE Corporation.

POLYMATH for the IBM PC and Compatibles Version 3.0 - Released April 1994
(Coauthored with M. Shacham)

POLYMATH software completely rewritten in "C" code with many new capabilities. Programs include:

- Simultaneous Differential Equations
- Simultaneous Algebraic Equations
- Polynomial, Multiple Linear and Nonlinear Regression

CACHE CD-ROM Volume 1, November 1994
(Organizer, Editor and Master Creator - Peter R. Rony, Initial Idea from then CACHE President - Michael B. Cutlip who also provided the Polymath Software.)
This was a unique collection of educational software, databases, interactive media and demonstration programs of general interest to Chemical Engineering students and faculty that was freely distributed by the CACHE Corporation, Austin, TX in celebration of the 25th anniversary of CACHE. The CD was given to attendees at the Annual AIChE Meeting including all students and interested AIChE members. Academic departments and academic faculty also received individual copies.

Cutlip, M. B. and M. Shacham, "POLYMATH Version 3.0 User-friendly Numerical Analysis Programs", 78 pages (1994).

POLYMATH for the IBM PC and Compatibles Version 4.0 - Released August 1996
(Coauthored with M. Shacham)

POLYMATH software with major enhancements in problem size and solution algorithms. Programs include:

- Simultaneous Differential Equations
- Simultaneous Algebraic Equations
- Simultaneous Linear Equations
- Polynomial, Multiple Linear and Nonlinear Regression

Cutlip, M. B. and M. Shacham, "POLYMATH Version 4.0 User-friendly Numerical Analysis Programs", 84 pages (1996).

CACHE CD-ROM Volume 2, March 1996
(Organizer, Editor and Master Creator - Peter R. Rony, Associate Editor - Michael B. Cutlip)
This was an update to the first CACHE CD_ROM and it contained updates and enhancements to educational software, databases, interactive media and demonstration programs of general

interest to Chemical Engineering students and faculty. This CD was distributed by the CACHE Corporation, Austin, TX.

POLYMATH for the IBM PC and Compatibles Version 4.01 - Released Sept. 1997
(Coauthored with M. Shacham)

POLYMATH software with modest enhancements to Version 4.0.

POLYMATH for the IBM PC and Compatibles Version 4.1 - Released July 1998
(Coauthored with M. Shacham)

POLYMATH software with modest enhancements to Version 4.01

Cutlip, M. B. et al, "A Collection of Representative Problem in Chemical Engineering for Solution by Numerical Methods," Session 12, American Society for Engineering Education, Summer School for Chemical Engineering Faculty, Snowbird, UT (August 13, 1997). These materials amounting to over 400 pages were also converted to Acrobat PDF format and made available via an FTP site at the University of Connecticut.

POLYMATH 5.0 for all 32-bit Windows Operating Systems - Released August 2000
(Co-authored with Mordechai Shacham and Michael Elly)

This completely reprogrammed POLYMATH package conveniently allows users to apply standard numerical analysis for interactive problem solving. This current version of POLYMATH takes full advantage of the current Windows(TM) operating systems while greatly improving the user friendliness that is so highly valued by current users.

POLYMATH allows chemical engineering students and professionals to select robust algorithms to solve the following types of problems:

- Simultaneous Linear Algebraic Equations
- Simultaneous Nonlinear Algebraic Equations
- Simultaneous Ordinary Differential Equations
- Data Regressions (Including the following:)
- Curve Fitting by Polynomials
- Multiple Linear Regression with Statistics
- Nonlinear Regression with Statistics
- Interpolation, Integration and Differentiation of Tabular Data

CACHE CD-ROM Volume 3, November 2000
(Editor - Michael B. Cutlip)

This CD contained a collection of Educational Software from the University of Michigan created under NSF Support and the POLYMATH Numerical Analysis Package. It was distributed by the CACHE Corporation, Austin, TX to approximately 1,000 students at the Annual AIChE Meeting in Los Angeles, California on November 11, 2000.

POLYMATH 5.1 for all 32-bit Windows Operating Systems - Released Feb. 2001
(Co-authored with Mordechai Shacham and Michael Elly)
This POLYMATH version contained modest enhancements and new installation capabilities.

POLYMATH 6.0 for all 32-bit Windows Operating Systems - Released March. 2005
(Co-authored with Mordechai Shacham and Michael Elly)

This new version of Polymath contained new major new editing capabilities and graphics. A new option enabled the export of Polymath problems to Excel. The automatic one-keypress export of Polymath program to Excel provided working Excel spreadsheets. A Polymath ODE_Solver for Excel (included with Polymath) allowed the solution of simultaneous ordinary differential equations within Excel. Another option created MATLAB code automatically from Polymath Program and provides templates to create m-files for MATLAB solution.

POLYMATH 6.1 for all 32-bit Windows Operating Systems - Released November. 2005
(Co-authored with Mordechai Shacham and Michael Elly)
This Polymath version contained modest enhancements and new installation capabilities.
Distribution Summary January, 2010: The CACHE academic site license for Polymath is in current use by about 130 universities, colleges or academic departments. Additionally some 35 academic departments in developing are using the academic site license at no cost. Seven textbooks either provide Polymath software on CD-ROMs or are extensively referencing Polymath with the textbooks for problem examples and problem solving.
Note - Polymath Software celebrated its 25th year as a PC product at the AIChE Annual Meeting in 2009 as it was first introduced at the AIChE Meeting in 1984.

Miscellaneous Publications

Cutlip, M. B., "Catalytic Decomposition of Nitric Oxide." Report available from Department of Chemical Engineering, University of Colorado, Boulder, Colorado (1968).

Cutlip, M. B., "Gauss-Newton Method of Nonlinear Estimation." Report available from Department of Chemical Engineering, University of Colorado, Boulder, Colorado (1968).

Bennett, C. O., M. B. Cutlip and C. C. Yang, "Transient Methods in Heterogeneous Catalysis II. The Steady State Assumption." report available from the Department of Chemical Engineering, University of Connecticut, Storrs, Connecticut (1972).

Cutlip, M. B., C. O. Bennett and C. C. Yang, "Transient Methods in Heterogeneous Catalysis III. Simulation of Nitrous Oxide Decomposition." report available from the Department of Chemical Engineering, University of Connecticut, Storrs, Connecticut (1972).

Cutlip, M. B., "Computer Assisted Experimentation in the Study of Adsorption, Catalysis and Reaction Kinetics." report available from Department of Chemical Engineering, University of Cambridge, Cambridge, England (1975).

Bett, J. A. S., M. B. Cutlip, et al, "Fuel Processing for Fuel Cells: A Model for Fuel Conversion and Carbon Formation in the Adiabatic Steam Reformer." Contract DE-AP21-82MC21290, for U. S. Department of Energy, Morgantown Energy Technology Center (1982).

Shacham, M. and M. B. Cutlip, "Interactive Linear and Nonlinear Regression at a Friendly Graphical Terminal," report available from the Department of Chemical Engineering, University of Connecticut, Storrs, Connecticut (1983).

Stonehart, P., M. B. Cutlip, et al., "Investigation of Electrode Structures and Electrocatalyst Surface Areas." Contract DEN3-350 administrated by NASA for the U. S. Department of Energy, Morgantown Energy Technology Center (1988).

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Cutlip, Michael B. and Mordechai Shacham, "The Numerical Method of Lines for Partial Differential Equations," CACHE Newsletter - Fall 1998.

Special Website:

Cutlip, M. B., "Summary of Undergraduate Research Opportunities (REU's) for Chemical Engineering Students" This special website has been published as a public service each year since 2004. The current website is found at http://www.engr.uconn.edu/~cutlipm/reu/ or at http://www.cmbe.engr.uconn.edu/reu.html.