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SUMMARY OF EXPERIENCE

More than 40 years of academic teaching and research, and professional practice in front-end engineering and technology assessment of refineries, petrochemicals, and wastewater treatment plants. **Academic: Undergraduate teaching:** thermodynamics, equilibrium stage separation, engineering economy, process and conceptual design, biochemical engineering, process optimization, and process dynamics and control. **Graduate teaching:** project management, and PE License Exam. **Research:** thermodynamics, liquid-liquid extraction, dynamic simulation, modeling and optimization, atomization of liquid fuels, energy conservation, process design and control, enhanced oil recovery, and environmental restoration and waste minimization. **Professional: Conceptual Design:** refineries, petrochemicals, utilities, supervisory control systems, fire water systems, offshore oil/gas separation, and wastewater treatment plants. **Engineering analysis and trouble shooting:** (a) optimization of steam and electrical power systems for refineries, (b) development of economic model for selecting and sizing petrochemical complexes utilizing linear programming techniques, (c) modeling two-phase flow in oil and gas transmission lines, (d) development of a directional drilling simulation model, (e) hydraulic network analysis for pumped and non-pumped fluids, and (f) development of a dynamic model for emergency depressurization of hydrocarbons processing systems. **Research and development:** mineral processing and advanced water and wastewater treatment, purification, and reclamation. **Professional training:** energy conservation, integration and optimization, FE and PE licensing review courses and human resources development (HRD).

EDUCATION Doctor of Philosophy in Chemical Engineering, University of Oklahoma, Oklahoma, USA (Dec. 1976)
Master of Science in Chemical Engineering (work qualified me to transfer my candidacy to Ph.D.), Monash University, Australia (1972)
Bachelor of Science in Chemical Engineering, Cairo University, Egypt (1965)

REGISTRATION Licensed P.E.: Texas #51718, and New Jersey #28756

MEMBERSHIP American Institute of Chemical Engineers, American Chemical Society, Water Pollution Control Federation, Instrument Society of America, Association of Energy Engineers, Society of Petroleum Engineers, Society of Plastic Engineers. All are in USA. Institute of Engineers (Australia), Syndicate of The Engineering Profession (Egypt).

DETAILED EXPERIENCE

ACADEMIC:

1984-Present **Professor** (1996- Present).
Associate Professor and Department Chairman (1985-1992).
Associate Professor (1984-1985).
Taught most of the Chemical Engineering undergraduate courses and a graduate course in project management. Offered short courses in PE Review and Energy Management. Conducting research in thermodynamics, composite materials, transport of fluids through porous media, and optimization of engineering systems.

1975-1977 **Research Graduate Fellow and Lecturer**, School of Chemical Engineering and Materials Science, University of Oklahoma, Norman, Oklahoma, USA.

1968-1972 **Graduate Student**, Department of Chemical Engineering, Monash University, Clayton, **Victoria, Australia**.

PROFESSIONAL:

1982-Present **Owner**, ABI Engineering Consultants, **Neptune, New Jersey** and **Houston, Texas**. Offering the industry consulting services in modeling, optimization, energy management, and human resources development.

1978-1982 **Senior Staff Engineer**, Brown and Root, Inc., **London, England** and **Houston, Texas**. Specialized in front-end engineering feasibility studies, trouble-shooting, economic evaluations, process optimization, and technology evaluation for refineries and petrochemical plants.

1977-1978 **Senior Process Engineer**, Sovereign Engineering International, Inc., **Aberdeen, Scotland** and **Houston, Texas**. Design of offshore processing facilities.

- 1973-1975 **Design Engineer**, Major Purification Plant Design Department, Melbourne and Metropolitan Board of Works, **Melbourne, Australia**. Design of Wastewater Treatment Plants.
- 1972-1973 **Industrial gas Engineer**, Gas and Fuel Corporation of Victoria, **Melbourne, Australia**. Design of Natural Gas Combustion Systems for Boilers and Furnaces, and Design of Gas Distribution Systems for Metropolitan Areas.
- 1965-1968 **Research Engineer**, Pilot Plant Laboratories, National Research Center, **Cairo, Egypt**. Design and Development of Duplex Swirl Nozzles for the Atomization and combustion of Liquid Fuels in Jet Engines.

SELECTED PUBLICATIONS:

1. "Optimization of Refinery Power and Energy Utilization," K. Fotouh, International Conference on Energy & Environment, Cairo, Egypt (2003)
2. "Prediction of Phase Equilibria in Binary Mixtures Using an Improved Equation of State and a Theoretically Consistent Mixing Rule," K. Fotouh and K. Shukla, Chemical Engineering Communication, 166, 35-56 (1998)
3. "An Improved Perturbation Theory and Van der Waals One-Fluid Theory of Binary Fluid Mixtures. Part II: Phase Equilibria," K. Fotouh and K. Shukla, Jr. of Fluid Phase Equilibria, 137, 1- 16 (1997)
4. "An Improved Perturbation Theory and Van der Waals One-Fluid Theory of Binary Fluid Mixtures. Part I: Total and Excess Thermodynamic Properties," K. Fotouh and K. Shukla, Jr. of Fluid Phase Equilibria, 137, 45-70 (1997)
5. "Excess Properties of Ternary Fluid Mixtures From Simulation, Perturbation Theory and van der Waals' One Fluid Theory: Size and Energy parameter Effects," K. Fotouh and K. Shukla, Chemical Engineering Science (CES), 52, 1680-1693 (1997)
6. "Excess Properties of Ternary Fluid Mixtures From Simulation, Perturbation Theory and van der Waals' One Fluid Theory: : Deviation from Lorentz-Berthelot Combination Rule," K. Fotouh and K. Shukla, Chemical Engineering Science (CES), 52, 2369-2382 (1997)
7. "An Improved Peng-Robinson Equation of State with a New Temperature Dependent Attractive Term," K. Fotouh and K. Shukla, Chemical Engineering Communication, 159, 209-229 (1997)

8. "Effect of Quadrupole Moment on Excess Properties of Binary 2CLJQ Mixtures From Molecular Dynamic Simulation: Model and Real Mixtures," K. Fotouh and K. Shukla, Jr., *Fluid Phase Equilibria*, 135, 35-50 (1997)
9. "A Comparative Study of Numerical Methods for Calculating Phase Equilibrium in Fluid Mixtures From an Equation of State," K. Fotouh and K. Shukla, *Chemical Engineering Science*, 51, 3763 - 3771 (1996)
10. "CO₂ Utilization by Gas Discharges," K. Fotouh and C. Liu, ACS-Division of Fuel Chemistry Symposium on CO₂ Capture, Utilization and Disposal, Orlando, Florida, August 25- 29 (1996)
11. "Thermodynamic Properties of Ternary Fluid Mixtures from the Improved Perturbation Theory and Van der Waals One-Fluid Theory. Part I: Model Mixtures," K. Fotouh and K. Shukla, *Chemical Engineering Science*, 51 (21), 4923-4931 (1996)
12. "Thermodynamic Properties of Ternary Fluid Mixtures From the Improved Perturbation Theory and Van der Waals One-Fluid Theory. Part II: Real Mixtures," K. Fotouh and K. Shukla, *Chemical Engineering Science*, 51(21), 4933-4937 (1996)
13. "Thermodynamics and phase equilibria of nonideal fluid mixtures from Perturbation Theory and Van der Waals One-Fluid Theory and computer simulation," K. Fotouh and K. Shukla, AIChE Spring National Meeting, new Orleans, LA (1996)
14. "Vapor/liquid phase equilibria in binary fluid mixtures under supercritical conditions using the area method," K. Fotouh and K. Shukla, internal report (1995)
15. "Calculation of phase equilibria in fluid mixtures using an equation of state and thermodynamically consistent mixing rules," K. Fotouh and K. Shukla, AIChE Annual Meeting, Miami Beach, FL (1995)
16. "Phase Equilibria of Supercritical Carbon Dioxide and Hydrocarbon Mixtures from an Equation of State," K. Fotouh and K. Shukla, unpublished results (1995)
17. "Phase Equilibria for Supercritical Binary Fluid Mixtures using the Area Method," K. Fotouh and K. Shukla, unpublished results (1995)
18. "Thermodynamics Properties Prediction for Water-Hydrocarbons Mixtures under Supercritical Conditions," K. Fotouh and K. Shukla, AIChE national Meeting, Atlanta, Georgia (1994)

19. "Advanced Computational Modeling of Improved Oil Recovery," K. Fotouh, Technical Report Submitted to Texas Advanced Research Fund, Texas Coordinating Board for Higher Education, Aug (1993)
20. "The Role of Minority Institutions in the Chemical Engineering Education," K. Fotouh, AIChE National Meeting, St. Louis, Missouri, Oct. (1993)
21. "Conceptual Design and Modeling of Protection Suits," K. Fotouh, PVAMU-CEA First Research Symposium, Prairie View, Texas, March (1993)
22. "Development of a Dynamic Model for Ceramic Composites Manufacturing," K. Fotouh, General Electric - Corporate Research and Development GE-CRD), Schenectady, NY, Propriety Report, July/August (1993)
23. "Integrated Design of Protection Ensembles," K. Fotouh, AIChE National Spring Meeting, Houston, Texas, April 1(1993)
24. "Atlantic Warrior® Immersion Protection," K. Fotouh, Technical Propriety Report submitted to McDonnell Douglas, October (1992)

PROFESSIONAL DEVELOPMENT:

- (1998-99)1. • Reviewed and Edited Vol. 2 of ABET Report for The Department of Chemical Engineering.
- HYSYS Steady-State (June 6 - 8, 1998), Hyprotech, Inc., Houston, Texas.
 - HYSYS Dynamics (June 10 -12, 1998), **ibid.**
 - HYSIM Introduction (July 16 - 17, 1998), **ibid.**
 - HYSIM Advanced Flowsheeting (August 19 - 20, 1998), **ibid.**
 - HYSYS Introduction to Automation and Extension (August 24 - 25, 1998), **ibid.**
 - Pinch Analysis - University of Manchester Integrated Design Center and Hyprotech, Inc. (October 24-25, 1998), **ibid.**
 - HYSYS Simulation of Refining Processes, Hyprotech, Inc. (Oct. 26-28, 1998), **ibid.**
- (1996-97) • National Educators 11th Workshop on: Materials Science and Engineering, DOE Los Alamos National Laboratories, **New Mexico**, October 27-30, 1996.

- Presided on Session V, The University-Wide Faculty Conference, titled;“ Responding to Critical Issues: Short- and Long-Term Solutions and Commitments”, Friday, August 16, 1996, Prairie View, **Texas**.
 - Elected Faculty Senator from the College of Engineering, The University Senate, for two year term, **ibid**.
- (1995-96)
- Reviewed a manuscript titled; "Preparation of Nanostructured Platinumium/Yttria Stabilized Zirconia Cermet by Sol-Gel Method, " by H. Shiga, T. Okubo and M. Sadakata, University of Tokyo, Japan, for Industrial & Engineering Chemistry Research, April 1996.
- (1993-95)
- Taught four units (Mass and Heat Transfer, Separation Processes, Thermodynamics, and Process Design) of the Principles and Practice Professional Engineering Examination Review Course, at the University Of Houston.
- (1991-93)
- Coordinated a review course for the Engineering Fundamentals Examination (E.I.T.), College of Engineering, Prairie View A&M University, Texas.

Courses Taught

(1984-Present) • Taught effectively and successfully the following engineering courses:

Course Title	Number of Times Taught
Engineering Professional Concepts I (coordinator)	10
Computer Applications	10
Engineering Graphics	2
Computer Graphics	2
Engineering Economy (coordinator)	30
Materials Science	5
Material and Energy Balances	4
Chemical Engineering Thermodynamics I	5
Chemical Engineering Thermodynamics II	8
Reaction Engineering	5
Chemical Engineering Seminar	8
Process Design and Analysis (coordinator)	12
Process Dynamics and Control	8
Design Laboratory	6
Control Laboratory	2
Senior Project I	8
Senior Project II	8
Engineering Systems Design (Coordinator)	12
Bioengineering (Coordinator)	6
Engineering Optimization (Coordinator)	10
Modeling and Simulation (Coordinator)	2
Project Engineering Management (Graduate)	5
Advanced Engineering Economy	3