

## CURRICULUM VITAE

### PERSONAL RECORD

*Name* : E. M. Bakr  
*Date of Birth* : August 30, 1952  
*Marital Status* : Married with two Sons  
*Address* : Building # 6, Street # 287, New Maadi  
Cairo, Egypt  
Telephone: +202-25190672 (Home)  
+202-25558413 (Office & Fax)  
+202-010-168-3173 (Cell)  
+202-011-373-3193 (Cell)  
E-mail : mokhtarbakr@yahoo.com  
: mokhtar\_bakr@hotmail.com



### ACADEMIC DEGREES

- Ph.D.** "Nonlinear Dynamics of Flexible Multi-body Systems" Mechanical Engineering, *University of Illinois (UIC), U.S.A*, 22<sup>nd</sup> March 1987.
- M.Sc.** "Computer Aided Analysis of Legged Locomotion Systems" Materials Engineering, *University of Illinois (UIC), U.S.A*, 13<sup>th</sup> June 1982.
- B.Sc.** Production Engineering, *University of Helwan (HU), Cairo, Egypt*, May 1975.

### TEACHING EXPERIENCE

Instructed the following courses at *Helwan University (HU), Cairo, Egypt*, the *University of Illinois (UIC), Chicago, U.S.A.*, the *American University in Cairo (AUC), Egypt*, the *University of Bahrain (UOB), Kingdom of Bahrain*, the *German University in Cairo (GUC), Egypt*, and *Virginia State University (VSU), Petersburg, Virginia, U.S.A.*

#### I - Courses Taught at the Undergraduate Level:

Statics, Dynamics, Kinematics and Dynamics of Machinery, Theory of Machines, Mechanics of Materials, Applied Stress Analysis, Theory of Elasticity, Principles of Finite Element Method, Design of Machine Elements, Fundamentals of Robot Manipulators, Mechanical Engineering Drawing, Computer Aided Analysis of Mechanical Systems, Material Handling Equipment, Strength of Materials.

#### II- Courses Taught at the Graduate Level:

Advanced Theory of Machines, Nonlinear Finite Elements Analysis, Analysis of Flexible Robot Arms, Dynamics of Flexible Multi-body Systems, Continuum Mechanics.

### RESEARCH INTERESTS

Flexible Multi-body System Dynamics, Biomechanical Modeling of Human Spines, Computer Aided Analysis of Human Back Pain Problems, Kinematics and Dynamics of Flexible Robot Manipulators, Mechanics of Legged Locomotion Systems, Nonlinear Finite Element Analysis.

## **EMPLOYMENT RECORD**

### Nov. 2007 – Present

Vice-Dean for Graduate Studies and Research, College of Engineering, *Helwan University (HU)*, Cairo, Egypt.

### Nov. 2004 – Oct. 2007

Professor and coordinator of the Mechatronics Division of the Department of Mechanical Engineering, College of Engineering, *Helwan University (HU)*, Cairo, Egypt.

### Sept. 2006 – May 2007

Fulbright Visiting Professor, Department of Engineering Technology, *Virginia State University (VSU)*, Petersburg, Virginia, U.S.A.

### Feb. 2006 – August 2006

Part-time Professor, Department of Modeling and Simulation in Mechanics, *German University in Cairo (GUC)*, New Cairo City, Egypt.

### July 2001 – Oct. 2004

Associate Professor (Since Dec. 1993), Department of Mechanical Engineering, College of Engineering, *Helwan University (HU)*, Cairo, Egypt.

### Sept. 1991 - June 2001

Sabbatical Leave, Mechanical Engineering Department, College of Engineering, *University of Bahrain (UOB)*, Kingdom of Bahrain.

### Jan. 1988 - Aug. 1991

Part-Time Assistant Professor at the Department of Engineering, *American University in Cairo (AUC)*, Cairo, Egypt.

### June 1987 - Aug. 1991

Assistant Professor, Department of Production Engineering, College of Engineering, *Helwan University (HU)*, Cairo, Egypt.

### Jan. 1981 - Mar. 1987

Research-Teaching Assistant, Department of Mechanical Engineering, *University of Illinois (UIC)*, U.S.A.

### Nov. 1976 - Dec. 1980

Teaching Assistant, Department of Production Engineering, College of Engineering, *Helwan University (HU)*, Cairo, Egypt.

### Aug. 1975 - Nov. 1976

Field Engineer, Department of Heavy Road Equipment, **The Arab Contactors Company**, Osman Ahmed Osman, Cairo, Egypt.

## **CONFERENCES and WORKSHOPS ATTENDED and/or ORGANIZED**

- Member of the steering organizing committee of the Third International Conference “The Third Millennium and Advanced Technologies of Energy (Electric-Petroleum-Water), **Cairo, Egypt**, Nov. 25-27, 2007.
- Invited Speaker, College of Engineering, Marquette University (**MU**), **Milwaukee, Wisconsin, U.S.A.**, Mar. 16, 2007.
- Key note speaker, International Education week, Virginia State University (**VSU**), **Petersburg, Virginia, U.S.A.**, Nov. 13-17, 2006.
- Participated in the 9<sup>th</sup> Annual International Colloquium on International Engineering Education, **Newport, Rhode Island, USA**, Nov. 2-5, 2006.
- Participated in organizing the Faculty of Engineering-Germany Partnership Day, Helwan University (**HU**), **Cairo, Egypt**, Feb. 20<sup>th</sup> 2006.
- Completed the “Training of Trainers” Workshop (TOT) as a part of the Faculty and Leadership Development Project (FLDP), Jun. 25-29, 2005, Helwan University (**HU**), **Cairo, Egypt**.
- Participated in the First International Conference for Developing the Scientific Research System in Egypt, Conference Hall, Nasr City, **Cairo, Egypt**, May 2005.
- Presented a research paper at The Fourth International Engineering Conference (4<sup>th</sup> IEC), **Sharm El-Shiekh, Egypt**, Apr. 20-22, 2004.
- Presented two research papers at Al-Azhar Engineering 7<sup>th</sup> International Conference, **Cairo, Egypt**, Apr. 7-10, 2003.
- Presented a research paper at the 7th Conference on Theoretical and Applied Mechanics, **Cairo, Egypt**, Mar. 11-13, 2003.
- Member of the steering organizing committee of the International Conference and Exhibition on Advances in Production and Processing of Aluminum, 12-15 February 2001, **Manama, Kingdom of Bahrain**.
- Invited speaker at the 2<sup>nd</sup> Symposium on Quality of Engineering Education, Nov. 19<sup>th</sup>, 2000, **Manama, Kingdom of Bahrain**.
- Participated in the Workshop on Modernizing Basic and Engineering Sciences University Education through Computational and Networking Technologies, Collaboratively Organized by UNESCO Cairo Office, **United Arab Emirates University (UAE)**, 28-30 Apr. 1997.
- Presented a research paper in the Symposium on Mathematical Modeling, **Vienna, Austria**, Feb. 2-4, 1994.

- Presented a research paper in the second international symposium on three-dimensional analysis of human movement, Parc du Futuroscope, **Poitiers, France**, Jun. 30th – Jul. 3rd, 1993.
- Presented a research paper in the 13<sup>th</sup> IAVSD Symposium on Dynamics of Vehicles on Roads and Tracks, **Sichuan, China**, Aug. 23-27, 1993.
- Presented a research paper in the VDI/VDE Fachtagung: Intelligente Steuerung und Regelung von Robotern, **Langen, Germany**, Nov. 9-10, 1993.
- Presented a research paper in the Eighth International Conference for Mechanical Power Engineering, **Alexandria, Egypt**, Apr. 27-29, 1993.
- Participated at the Symposium Organized by the Arab Bureau of Education for the Gulf States, **United Arab Emirates**, Nov. 1992.
- Presented a research paper in the Sixth International Conference on Pressure Vessel Technology, **Beijing, People's Republic of China**, Sep. 11-16, 1988.
- Presented two research papers at the 4th IAVD Congress on Vehicle Design and Components, **Geneva, Switzerland**, Mar. 3-6, 1987.
- Presented a research paper at the ASME Mechanism Conference, **Columbus, Ohio, U.S.A.**, Oct. 5-8, 1986.
- Presented a research paper at the ASME Joint PVP & Computers in Engineering, Conference and Exhibition, July 20-24, 1986, **Chicago, Illinois, U.S.A.**

### **PROJECT DESIGN AND IMPLEMENTATION EXPERIENCE**

- Assisted in preparing for ABET accreditation visit Fall 2007 for manufacturing engineering and computer science programs, Department of Engineering, Virginia State University, Petersburg, Virginia (**VSU, USA**) (Sept. 2006-May 2007).
- Member of the Tempus JEP Project Number CD-JEP-32050-2004 on the Curricula Development for a New Mechatronics B.Sc. Major, Helwan University (**HU, Cairo, Egypt**), Feb. 2006.
- Member of the Teaching Committee in the Faculty and Leadership Development Project FLDP, HEEP project number B-132-K0, Ministry of Higher Education, **Cairo, Egypt**, March 2006.
- Member of the National Mechanical Engineering Committee for Accreditation and Academic Measures of the Egyptian Engineering Education Sector, **Cairo, Egypt**, June 2005.
- Participated in the developing the graduate studies' rules and regulations in Helwan and Menofia universities, Higher Education Enhancement Project Fund, HEEP Project Number F 132-K0, **Ministry of Higher Education, Egypt**, March 2005.

- Participated in Developing a Number of Programs and Short-Courses in Medical and Conventional Robots, Legged Locomotion Systems, Team-working, Creativity, and Innovation (2001-2005).
- Design and Construction of an 8-Legged Computer-Controlled Walking Machine, University of Bahrain (**UOB**), **Kingdom of Bahrain**, (Nov. 2003- Jul. 2004).
- Analysis of Back Pain Problems in Industrial Workers, Helwan University (**HU**), **Cairo, Egypt**, (2003 -April 2007).
- Nonlinear Dynamics Analysis of Flexible Vertebral Columns, Joint Research Study with **Loughborough University, United Kingdom**, (1995-2003).
- Upgrading the Teaching of Engineering Drawing, a multimedia project funded by the **UNESCO Cairo Office**, (Sept. 1997-Dec. 1999).
- Construction of a Six-Legged Vehicle System, project funded by the Deanship of Scientific Research at the University of Bahrain (**UOB**), **Kingdom of Bahrain**, (Sep.1995-Jun.1996).
- Building a Computer-Controlled Manipulator, project funded by Bahrain Aluminum Extrusion Company (**BALEXCO**), **Kingdom of Bahrain**, (Sept. 1993- Jun. 1995).
- Study of Human, Animals and Insects Motions, project funded by the Deanship of Scientific Research at the University of Bahrain (**UOB**), **Kingdom of Bahrain**, (Jan. 1992-Jun. 1993).
- Technical Arabic Translation of the Book Entitled, “Workshop Technology - Part II” by, W.A.J. Chapman, **Al Dar Al-Arabia Lil-Nashr**, ISBN 977-258-001-2, 1990.
- Organized a Number of Professional Engineering Graduation Projects Exhibitions, University of Bahrain (**UOB**), **Kingdom of Bahrain**, (1993-1996).

### **COMPUTER-CODE DEVELOPMENT**

- *PREPROC* : Preprocessor for the Dynamic Analysis of Mechanical Systems.
- *DAMS* : Dynamic Analysis of Multi-body Systems.
- *BPD* : Back Pain Detector.
- *GALLS* : Gait Analysis of Legged Locomotion Systems.

### **THESES SUPERVISING ACTIVITIES**

#### **Ph.D. Theses:**

1995 - 2003 : Dr. Aly Nowrooz Hussain  
 “Geometrically Nonlinear Model for the Dynamics of Human Back”,  
 Joint Research between the University of Loughborough, United  
 Kingdom and the Mechanical Eng. Department, Bahrain University.

1990 - 1994 : Dr. Saber Mohamed Abd-Rabou  
“Experimental and Analytical Investigations of Computer Controlled Legged Vehicles”, Faculty of Engineering at Shoubra, Zagazig University, Cairo, Egypt.

1989 - 1993 : *Dr. Essam Anis Moh’d Abd-Alla*  
“Simulation of An Industrial Robot For A Flexible Manufacturing Cell”, Joint Supervision Between the University of Wuppertal, Germany and Production Engineering Department, Helwan University, Cairo, Egypt.

### **M.Sc. Theses:**

2003 – 2007 : Eng. Mohamed Mostafa Mohamed  
“Dynamic Analysis of Back Pain Problems in Industrial Workers”, Department of Mechanical Eng., Helwan University, Cairo, Egypt.

1999 – 2001 : Eng. Shamsan Abbas.  
“Multi-body System Dynamics of Aircrafts at the Touch Down Impact”, Depart. of Mechanical Eng., Bahrain University, Bahrain.

1987 – 1990 : Eng. Bahaa E. Naser  
“Computer Analysis of Robot Arm Mechanisms”, Department of Mechanical Engineering, Helwan University, Cairo, Egypt.

1987 – 1991 : Eng. Tarek Ahmed Omar  
“Computer Aided Analysis of Flexible Machine Tool Mechanisms”, Department of Mechanical Eng., Helwan University, Cairo, Egypt.

### **HONORS AND AWARDS**

*Aug. 2006 – Present : Board of Trustees Nominee of the Faculty-Members’ Club of Helwan University.*

*Sept. 2006 - May 2007 : AY2006-2007 Fulbright Teaching / Research Award, College of Engineering, Virginia State University, Petersburg, U.S.A.*

*Dec. 1980 - Mar. 1987 : Peace Fellowship Award, USAID, University of Illinois, U.S.A.*

*Jul. 1979 - Aug. 1979 : Country of Egypt’s Representative in the “African Leaders’ Program”, U.S.A. Program included visits to 17 different States.*

## **REFERENCES\***

- Prof. G.E.O. Widera  
Professor and Senior Associate Dean  
College of Engineering, Marquette University  
210 Haggerty Engineering  
1515 W. Wisconsin Ave. (53233)  
P.O. Box 1881, Milwaukee, WI 53201-1881, USA  
Tel: 414-288-6720(-3543)  
Fax: 414-288-1647  
E-mail: [geo.widera@marquette.edu](mailto:geo.widera@marquette.edu)
  
- Prof. Keith Case  
Department of Manufacturing Engineering  
Loughborough University,  
Loughborough, Leicestershire,  
LE11 3TU UK  
Tel . : +44 (0)1509 222908  
Fax . : +44 (0)1509 267725  
E-mail : [k.case@lboro.ac.uk](mailto:k.case@lboro.ac.uk)
  
- Prof. Larry C. Brown  
Virginia State University  
School of Engineering, Science and Technology  
Room 161 W. Hunter McDaniel Bldg  
P.O. Box 9392  
Petersburg, VA 23806  
Tel. : 804-524-5285  
E-mail : [lbrown@vsu.edu](mailto:lbrown@vsu.edu)

*\* Further references can be furnished upon request*

## **PUBLICATIONS**

- E.M. Bakr and A.A. Shabana, "Geometrically Nonlinear Analysis of Multi-body Systems", Journal of Computers and Structures, Vol. 23, No. 6, PP. 739-751, 1986.
- E.M. Bakr and A.A. Shabana, "Application of Timoshenko Beam Theory to the Dynamics of Flexible Legged Locomotion with Variable Kinematic Structure", Presented at the ASME Mechanism Conference, Oct. 5-8, 1986, Columbus, Ohio, U.S.A., Paper No. 86-DET-101, PP. 1-11.
- E.M. Bakr, G.E.O. Widera and A.A. Shabana, "Nonlinear Analysis of Flexible Multi-body Systems", Presented at the ASME Joint PVP & Computers in Engineering, Conference and Exhibition, July 20-24, 1986, Chicago, Illinois, U.S.A., Workbook No. GOO36Y, PP. 63-97.
- A.A. Shabana, E.M. Bakr, C.W. Chang and J.R. Sany, "Users' Guide to PREDAMS: A Preprocessor for the Dynamic Analysis of Flexible Multibody Systems", Department of Mechanical Engineering, University of Illinois at Chicago, U.S.A., Oct. 1986.

- E.M. Bakr and A.A. Shabana, "Effect of Geometric Elastic Nonlinearities on the Impact Response of Flexible Multi-body Systems", *Journal of Sound and Vibration*, Vol. 112, No. 3, PP. 415-432, Jan. 1987.
- E.M. Bakr and A.A. Shabana, "Nonlinear Dynamic Modeling of Multi-body Vehicle Systems, Part I: Effect of Elastic Nonlinearities on the Dynamics of Timoshenko Beams", Presented at the 4th IAVD Congress on Vehicle Design and Components, Mar. 3-6, 1987, Geneva, Switzerland.
- E.M. Bakr and A.A. Shabana, "Nonlinear Dynamic Modeling of Multi-body Vehicle Systems, Part II: Finite Element Formulation", Presented at the 4th IAVD Congress on Vehicle Design and Components, Mar. 3-6, 1987, Geneva, Switzerland.
- E.M. Bakr and A.A. Shabana, "Timoshenko Beams and Flexible Multi-body Dynamics", *Journal of Sound and Vibration*, Vol. 116, No. 1, PP. 89-107, Jun. 1987.
- E.M. Bakr and A.A. Shabana, "Application of Timoshenko Beam Theory to the Dynamics of Flexible Legged Locomotion", *ASME Journal of Mechanisms, Transmission and Automation in Design*, Vol. 110, No. 1, PP. 28-34, Mar. 1988.
- E.M. Bakr, G.E.O. Widera and L.F. Lu, "Large Deformation Analysis of Flexible Pipes Subjected to Impact Loading", *Proceedings of the Sixth International Conference on Pressure Vessel Technology*, Sep. 11-16, 1988, Beijing, People's Republic of China, Vol. 1, PP. 509-522.
- E.M. Bakr, I. Gastouniotis and A.A. Shabana, "Dynamic Analysis of Flexible Multi-body Legged Vehicles Using the Finite Element Method", *International Journal of Vehicle Design*, Vol. 10, No. 1, PP. 1-15, 1989.
- L.A. Abdel-Latif, E.M. Bakr and M.I. Ghobrial, "Thermo-hydrodynamic Performance of Thrust Bearings with Circular Tilted Pads Under the Presence of Air/Gas Bubbles and Centrifugal Forces", *ASME Journal of Tribology*, Vol. 111, No. 3, PP. 510-517, Jul. 1989.
- A.A. Tantawy and E.M. Bakr, "CAPP for CNC Milling Processes Within High-Efficiency Zone", *Engineering Research Bulletin, University of Helwan, Cairo, Egypt*, Vol. 8, PP. 109-121, 1989.
- B.M. Naser, A.R. Moussa, E.M. Bakr and M.A. Nasr, "Spatial Transient Analysis of Elasto-Rigid Manipulators", *Engineering Research Bulletin, Ain Shams University, Cairo, Egypt*, Vol. 26, No. 1, PP. 436-452, 1991.
- A.M. Moussa, T.A. Omar, E.M. Bakr and L.A. Abdel-Latif, "Static Analysis of Timoshenko Beams", *Engineering Research Bulletin, University of Helwan, Cairo, Egypt*, Vol. 6, PP. 85-96, Oct. 1991.
- E.M. Bakr, "A Study on the Gaits of Legged Locomotion Systems", *Engineering Research Bulletin, University of Helwan, Cairo, Egypt*, Vol. 2, PP. 160-182, Apr. 1992.
- E.A. Taqi and E.M. Bakr, "Technician and Engineering Education at the University of Bahrain", Presented at the Symposium Organized by the Arab Bureau of Education for the Gulf States, U.A.E., Nov. 1992.
- E.M. Bakr, L.A. Abdel-Latif, A.R. Moussa and T.A. Omar, "A Modified Finite Element Formulation for the Dynamics of Shaper Mechanisms", *Engineering Research Bulletin, University of Helwan, Cairo, Egypt*, Vol. 4, PP. 187-210, Sep. 1992.
- S.M. Abd-Rabou, E.M. Bakr, M.A. Salam Ali and M.Z. Zahran, "A New Experimental Computer Controlled Legged Vehicle", *Proceedings of the Eighth International Conference for Mechanical Power Engineering, Alexandria, Egypt*, PP. 105-115, April 27-29, 1993.
- E.M. Bakr and M.S. Habib, "A New Biomechanical Model for the Study of Human Body Dynamics", *Proceedings of the Second International Symposium on Three*



Dimensional Analysis of Human Movement, Parc du Futuroscope, Poitiers, France, June 30th - July 3rd, 1993.

- H.J. Pu, E. Abdalla, L. Abdelatif, E.M. Bakr and H.A. Nour Eldin, "Parallel Computation of the Manipulator Inertia Matrix Through One Directional Recursion in the Newton-Euler Formulation", VDI/VDE Fachtagung: Intelligente Steuerung und Regelung von Robotern, Langen, Nov. 9-10, 1993, Germany.
- M.S. Habib and E.M. Bakr, "Optimum Vehicle Parameters of Pilot-Vehicle Directional Stability", Presented at the 13th IAVSD Symposium on Dynamics of Vehicles on Roads and Tracks, Aug. 23-27, 1993, Sichuan, China.
- H.J. Pu, M. Muller, E. Abdalla, L. Abdelatif, E.M. Bakr and H.A. Nour Eldin, "Inertia Matrix of a Tree Type Robot Using One Directional Recursion of Newton-Euler Formulation", MATHMOD VIENNA, Proceedings of the IMACS Symposium on Mathematical Modeling, Vol. 4, PP. 626-629, Feb. 2-4, 1994. Vienna, Austria.
- M. Muller, E. Abdalla, L. Abdelatif, E.M. Bakr and H.A. Nour Eldin, "Parallel Computation of the Inertia Matrix of a Tree Type Robot Using One Directional Recursion of Newton-Euler Formulation", Journal of Intelligent and Robotic Systems, Vol. 15, No. 1, PP. 33-39, 1996.
- M.S. Habib and E.M. Bakr, "The Selection of Optimum Vehicle Parameters Based on the Pilot-Vehicle Directional Stability", Supplement to Journal of Vehicle System Dynamics, Vol. 23, PP. 182-196, 1994.
- E.M. Bakr, "Dynamic Analysis of Geometrically Nonlinear Robot Manipulators", Nonlinear Dynamics, An International Journal of Nonlinear Dynamics and Chaos in Engineering Systems, Vol. 11, No. 4, PP. 329-346, 1996.
- E.M. Bakr, "Impact Analysis of Flexible Multi-Armed Terrestrial Robots", Paper No. DETC97/VIB-4214, Presented at the First ASME Symposium on Multi-body Dynamics and Vibration at the Sixteenth Biennial Conference on Mechanical Vibration and Noise, Sacramento, California, U.S.A., Sept. 14-17, 1997.
- E.M. Bakr, K. Case and A.H. Nowrooz, "Reliable Data for the Finite Element Modeling of Human Spines", Presented at the 7th Conference on Theoretical and Applied Mechanics, Cairo, Egypt, Mar. 11-13, 2003.
- E.M. Bakr, "A Spatial Formulation for the Dynamics of Flexible Multi-Segment Human Models", Presented at Al-Azhar Engineering 7th International Conference, Cairo, Egypt, April 7-10, 2003.
- E.M. Bakr, A.H. Nowrooz and K. Case, "Elasto-Rigid Biodynamic Modeling of Human Lifting Activities", Presented at Al-Azhar Engineering 7th International Conference, Cairo, Egypt, April 7-10, 2003.
- E.M. Bakr, "A New Finite Element Model for the Lumbo-Sacral (L5/S1) Motion Segment of the Human Spines.", Presented at The Fourth International Engineering Conference (4th IEC), Sharm El-Shiekh, Egypt, April 20-22, 2004.
- E.M. Bakr, "An Experimental Legged Locomotion Vehicle With Pure Mechanical Components", Engineering Research Bulletin, Vol. 91, PP. M51-M66, February 2004, Helwan University, Faculty of Engng., Mataria, Cairo, Egypt.
- E.M. Bakr, "A Mathematical Approach for Gait Analysis in Horses", Engineering Research Bulletin, Vol. 92, PP. M54-M73, April 2004, Helwan University, Faculty of Engng., Mataria, Cairo, Egypt.