RESUME

Stephen D. Umans

5 Regent Rd.
Belmont, MA 02478
617-306-9773
umans@alum.mit.edu

Born: Cleveland, Ohio - November 10, 1948

Citizenship: U.S.

Education:

Sc.D.	MIT	Dept. of E.E.	February l976
E.E.	MIT	Dept. of E.E.	February l973
S.M.	MIT	Dept. of E.E.	June l972
S.B.	MIT	Dept. of E.E.	June l972

Professional Experience:

July 2006 – Present: Adjunct Professor, Department of Electrical Engineering & Computer Science, Case Western Reserve University

Jan 2004 - Present: Independent Consultant.

June 1996 – Dec 2003: Principal Research Engineer and Lecturer, MIT Department of Electical Engineering and Computer Science, MIT Electromechanical Systems Laboratory

Commonwealth of Massachusetts Energy Facilities Siting Council. Public Electricity Member. July, 1986 - November, 1988

July 1981 – May 1996: Principal Research Engineer, MIT Laboratory for Electromagnetic and Electronic Systems, (formerly Electric Power Systems Engineering Laboratory). Lecturer, MIT Department of Electrical Engineering and Computer Science

Summer 1992 - NASA/ASEE Summer Faculty Fellow at NASA Lewis Research Center, Cleveland, Ohio

January l976 - June l98l: Research Associate, MIT Electric Power Systems Engineering Laboratory

l970 - l976: Teaching and Reseach Assistant, MIT, Dept. of Electrical Engineering. MIT Electric Power Systems Engineering Laboratory.

Organization Membership:

IEEE - Elected a Fellow of the IEEE in Jan, 1995. Citation reads "for contributions to the theory and practice of modeling and analysis of turbogenerators and their interactions with electrical transmission systems"

IEEE Power Engineering Society
- Electric Machinery Committee (1990 -)
- Synchronous Machinery Subcommittee (1977 -)
- Joint Working Group on the Determination of Synchronous Machine Stability Study Constants (1974 - 1992), Secretary (1980 - 1992)
- Working Group to Revise IEEE Standard 115-1965: Test Procedures for Synchronous Machines (1979 - 1983)
- Working Group to Revise IEEE Standard 115-1983: Test Procedures for Synchronous Machines (1991 - 1995)
- Working Group which wrote IEEE Standard 1110-1991 – IEEE Guide for for Synchronous Generator Modeling Practices in Stability Studies (1988-1991)
- Working Group to Revise IEEE Standard 1110-1991 – IEEE Guide for Synchronous Generator Modeling Practices in Stability Studies (1995 -)
- Nikola Tesla award committee (2005 – 2007)

IEEE Industry Applications Society

National Academy of Engineering - Elected to membership in 2009. Citation reads "For outstanding teaching and contributions to the development and understanding of electric machinery"

Registered Professional Engineer in the Commonwealth of Massachusetts

Expertise:
- Electromechanics
- Electric machinery
- Quasi-static electromagnetics
- Electric power systems

Teaching Experience:

MIT

6.002 - Circuits and Electronics: Introductory undergraduate circuit theory course.

Spring, 1989 - Recitation instructor
Fall, 1990 - Recitation instructor
Spring, 1998 – Recitation instructor
Fall, 1998 – Recitation instructor
Fall, 2002 – Recitation instructor
Fall, 2003 – Recitation instructor

6.911/6.912 - Quasistatic Electromagnetic Fields, Energy and Forces in Engineering Systems: A two semester course sequence covering quasi-static electromagnetic field theory and electro-mechanics, offered for the first time during the 1987-1988 academic year. I both developed the curriculum and taught this course during the 1987-1988 school year

6.013 - Electromagnetic Fields and Energy: Undergraduate core subject in quasi-static electromagnetic field theory.

Spring, 1980 - Recitation instructor
Spring, 1984 - Recitation instructor
Fall, 1984 - Recitation instructor
Spring, 1985 - Lecturer and in-charge
Fall, 1985 - Recitation instructor
Spring, 1986 - Recitation instructor
Fall, 1986 - Lecturer and in-charge
Spring, 1987 - Recitation instructor
Fall, 1989 - Recitation instructor
Spring, 1990 - Recitation instructor
Spring, 1991 - Recitation instructor

6.013 – Electromagnetics and Applications (revised): Undergraduate core subject in electromagnetic field theory.

Spring, 2003 - Recitation instructor

6.601 - Fields, Forces and Motion: Undergraduate elective subject in electromagnetic energy conversion.

Fall, 1983 - Instructor and in-charge
Fall, 1992 - Instructor and in-charge

6.302 - Feedback Systems: Undergraduate elective subject in classical feedback theory.

Spring, 1983 - Recitation instructor

6.681 - Electric Power Systems Engineering I: Graduate elective subject emphasizing the steady-state performance of electric power systems.

Fall, 1978 - Instructor and in-charge
Fall, 1980 - Instructor and in-charge

6.682 - Electric Power Systems Engineering II: Graduate elective subject emphasising the transient performance of electric power systems.

Spring, 1981 - Instructor and in-charge

6.141 - Energy and Electromechanical Systems Project Laboratory: In-charge. 1979-1988

6.101 - Introductory Analog Electronics Laboratory:

Fall, 1991 - Instructor and in-charge
Spring, 1992 - Instructor and in-charge
Fall, 1992 - Instructor and in-charge
Spring, 1993 - Instructor and in-charge
Fall, 1994 - Instructor and in-charge
Spring, 1995 - Instructor and in-charge

6.061 Introduction to Electric Power Systems : This course is offered primarly for Naval Officers in the Ocean Engineering graduate program.

Summer, 1986 - Instructor and in-charge
Summer, 1993 - Instructor and in-charge
Summer, 1994 - Instructor and in-charge
Spring, 1997 – Instructor and in-charge
Spring, 1999 – Instructor and in charge

6.071 Introduction to Electronics: Introductory course in electronics intended for students with little or no background in electrical engineering. Primarily offered for non-EE engineering majors.

Spring, 2001 – Instructor and in-charge

6.003 - Signals and Systems: Undergraduate core subject in the mathematics of circuit analysis

Fall, 1995 - Recitation instructor

2.671 - Measurement and Instrumentation: Mechanical engineering undergraduate laboratory course teaching the fundamentals of measurement techniques.

Fall, 1995 - Recitation instructor

6.02S - Operation and Performance of AC Induction Motors: Four day course offered for the first time as part of the MIT Summer Session, July 23-26, 1990 to practicing engineers. Topics included induction motor fundamentals, anaysis, performance and testing.

Supervision of S.B., S.M. and Ph.D. theses. Member of Doctoral thesis committees for both the EECS and Mechanical Engineering departments.

Case Western Reserve University

EECS 397 - Introduction to Electric Power Systems.

Spring, 2008 - Instructor and in-charge. Course development (this was the first offering of this course)
Spring, 2009 - Instructor and in-charge

Boston University

SC582 - Electric Machines and Power Systems: Graduate elective introducing basic concepts of electric power systems analysis and dynamics.

Spring, 1984 - Instructor and in-charge. Course development (this was the first offering of this course)

Tel Aviv University - Gordon Center for Energy Studies

The Performance and Analysis of Synchronous Machines in Electric Power Systems Applications: This mini- course was offered June 3-6, 1990. Students included graduate students at Tel Aviv University and practicing engineers from the Israel Electric Company.

Consulting Experience:

Astro-Dynamics
Arthur D. Little, Inc.
American Electric Power Service Corp
Wind Turbine Generator, Inc.
U.S. Windpower
Leviton Manufacturing Co., Inc.
Murphey and Mitchell, P.C.
New York State Department of Public Health
Alexander Kusko, Inc.
Walco Electric
Rexham, Inc.
Bostitch, Div. of Textron, Inc.
Commonwealth of Massachusetts Energy Facilities Siting Council
Failure Analysis Associates
United Investment Group
J.T. Baker Chemical
Superior Electric Corp
Industrial Engineering and Machining Co., Inc.
Advanced Mechanical Technologies, Inc.
Design Technologies Inc.
Empire State Electric Energy Research Council
Electrical Apparatus and Service Association
Shea & Gould
EG&G Idaho National Labs
Webster & Sheffield
Electric Power Research Institute
EML Research
Bolt, Beranek and Newman, Inc.
Foster-Miller, Inc.
Meehan, Boyle & Cohen
United Technologies/Carrier Corporation
Copeland & Hession
Modell Development Corp.
Turner Construction Co
Health Effects Institute
MathSoft, Inc.
SatCon Technology Corp.
Warner & Stackpole
Madan & Madan
Cleveland Machine Controls
Willian Brinks Hofer Gilson \& Lione
Welsh & Katz, Ltd.
EG&G Rotron
Reliance Electric
Rockwell Automation
Baldor Electric

BIBLIOGRAPHY

Books:

Electric Machinery, 4th edition, McGraw-Hill Book Co., N.Y., 1983 (co-authors: A.E. Fitzgerald (deceased) and C. Kingsley, Jr.)

Electric Machinery, 5th edition, McGraw-Hill Book Co., N.Y., 1990 (co-authors: A.E. Fitzgerald (deceased) and C. Kingsley, Jr.)

Electric Machinery, 6th edition, McGraw-Hill Book Co., N.Y., 2003 (co-authors: A.E. Fitzgerald (deceased) and C. Kingsley, Jr. (deceased))

Software:

Electric Machinery Examples, McGraw-Hill Book Co., N.Y. 1986

Papers:

"A Model Power System - Part I - Design of the Model Generator," by G.L. Wilson and S.D. Umans, presented at the IEEE 1975 PES Winter Power Meeting, Conference Paper No. C 75 l74-8.

"A Model Power System - Part II - Design of System Elements and Test Results," by S.D. Umans, J. Szajner and G.L. Wilson, presented at the IEEE 1975 PES Winter Power Meeting, Conference Paper No. C 75173-0.

"Modeling of Solid Rotor Turbogenerators - Part I - Theory and Techniques," by S.D. Umans, J.A. Mallick and G.L. Wilson, IEEE, PAS, Vol. 97, No. l, January/February l978.

"Modeling of Solid Rotor Turbogenerators - Part II - Example of Model Derivation and Use in Digital Simulation," by S.D. Umans, J.A. Mallick and G.L. Wilson, IEEE PAS, Vol. 97, No. l, January/February 1978.

"Turbine-Generator Shaft Torques and Fatigue - Part I – Simulation Methods and Fatigue Analysis," by M.C. Jackson, S.D. Umans, R.D. Dunlop, S.H. Horowitz and A.C. Parikh, IEEE PAS, Vol. 98, No. 6, November/December 1979.

"Turbine-Generator Shaft Torques and Fatigue - Part II - Impact of System Disturbances and High Speed Reclosure," by R.D. Dunlop, S.H. Horowitz, A.C. Parikh, M.C. Jackson, and S.D. Umans, IEEE PAS, Vol. 98, No. 6, November/December l979.

"Three Dimensional Transient Analysis of Superconducting Generators," by S.D. Umans, P.B. Roemer, J.A. Mallick and G.L. Wilson, IEEE PAS, Vol. 98, No. 6, November/December l979.

"Turbine-Generator Shaft Torques and Fatigue - Part III – Refinements to Fatigue Model and Test Results," by M.C. Jackson and S.D. Umans, IEEE PAS, Vol. 99, No. 3, May/June l980.

"Modeling and Analysis of the Wanlass Induction Motor Configuration," by S.D. Umans and H.L. Hess, IEEE PAS, Vol. 102, No. 9, September 1983

"AC Induction Motor Efficiency", by S.D. Umans, Proceedings: 19'th Electrical Electronics Insulation Conference, Chicago, Ill, Sept 25-28, 1989, pp. 99-107. Paper received an award in "recognition of the highest achievement in a technical paper".

"Cryogenic Isolating Torque Tubes for a Superconducting Generator: Detailed Model and Performance Analysis", by J.L. Kirtley, Jr., J.L. Smith, Jr., and S.D. Umans, IEEE Transactions on Energy Conversion, Vol. 6, No. 2, June 1991

"Ten MVA Superconducting Generator Development: Status at the End of 1989", by J.L. Kirtley, Jr., J.L. Smith, Jr., and S.D. Umans, IEEE Transactions on Energy Conversion, Vol. 6, No. 2, June 1991

"Detection of Broken Bars in Induction Motors Using State and Parameter Estimation", by K.R. Cho, J.H. Lang, and S.D. Umans, IEEE Transactions on Industry Applications, Vol. 28, No. 3, May/June 1992

"The Origin and Reduction of Acoustic Noise in Doubly Salient Variable-Reluctance Motors", by D.E. Cameron, J.H. Lang, and S.D. Umans, IEEE Transactions on Industry Applications, Vol. 28, No. 6, November/December 1992

"The McGill/MIT Direct Drive Motor Project", by J.M. Hollerbach, I. Hunter, J. Lang, S. Umans, R. Sepe, E. Valler and I. Garabieta, Proc. IEEE Intl. Conf. Robotics and Automation, May 2-7, 1993, Atlanta, pp. 2:611-617

"Ten MVA Air-Gap Armature Winding: Thermal, Stuctural and Dielectric Results", by J.L. Kirtley, Jr., J.L. Smith, Jr., S.D. Umans and W.H. Hagman, IEEE Transactions on Energy Conversion, Vol. 9, No. 2, June 1994, pp 349-358

"Integrated Design of a Boost Converter", by K. Sridhar, J.H. Lang and S.D. Umans, Proceedings: Applied Power Electronics Conference, Dallas, TX, March 5-9, 1995, pp. 160-168

"Performance of MIT 10 MVA Superconducting Generator Rotor", by J.L. Smith, Jr., J.L. Kirtley, Jr., S. Sunder and S.D. Umans, IEEE Transactions on Applied Superconductivity, Vol. 5, No. 2, Pt. 1, June 1995, pp 445-448

"Steady-State Lumped-Parameter Model for Capacitor-Run Single-Phase Induction Motors", by Stephen D. Umans, IEEE Transactions on Industry Applications, Vol. 32, No. 1, January/February 1996 and errata in Vol. 32, No. 6, November/December 1996

"A Latching Mechanism for Unloading a Rotary Compressor", by M.D. Webb, J.L. Smith, Jr. and S.D. Umans. Presented at the ASME 1999 International Mechanical Engineering Congress & Exposition, Mov. 14-19, 1999. (Scheduled for subsequent publication in the Proceedings of the ASME Advanced Energy Systems Division.)

"An Electostatic Induction Micromotor Supported on Gas-Lubricated Bearings", by L.G. Frechette, S.F. Nagle, R. Ghodssi, S.D. Umans, M.A. Schmidt and J.H. Lang, Proceedings: IEEE Workshop on Micro Electro Mechanical Systems, Interlaken, Switzerland, Jan. 21-25, 2001, pp. 290-293

"A High-Power MEMS Electrostatic Induction Motor", by C. Livermore, A. Forte, T. Lyszczarz, S. Umans and J. Lang, Proceedings of the 2002 Solid State Sensor, Actuator, and Microsystems Workshop, Hilton Head Island, SC, June 2002, p. 251-254

"A Six-Phase Multilevel Inverter for MEMS Electrostatic Induction Micromotors", by T.C. Neugebauer, D.J. Perreault, J.H. Lang, C. Livermore and S.D. Umans, Proceedings of the 33rd Annual IEEE Power Electronics Specialists Conference, Cairns, Australia, June 2002, pp. 695-700

"Microscale Electric Induction Machines for Power Applications", by C. Livermore, A. Forte, T. Lyszczarz, S. D. Umans and J. Lang, Proceedings: Institute of Physics Conference Series 178 (Electristatics 2003), pp. 45-52, March 23-27, 2003

"Electric Induction Motor/Generators for Portable Power Applications", by C. Livermore, A. Forte, T. Lyszczarz, Proceedings of the 2003 Collaborative Technology Alliances Symposium, pp. 35-39, May 2003

"A Six-Phase Multilevel Inverter for MEMS Electrostatic Induction Micromotors", by T.C. Neugebauer, D.J. Perreault, J.H. Lang, C. Livermore and S.D. Umans, IEEE Transactions on Circuits and Systems – Express Briefs, **51**, pp 49-56, Feb. 2004

"A High-Power MEMS Electric Induction Micromotor:, by C. Livermore, A. Forte, T. Lyszczarz, S.D. Umans, A.A. Ayon, and J.H. Lang, IEEE Journal of Microelectromechanical Systems 13, 465-471, June 2004.

"An Electrostatic, ON/OFF MEMS Valve Designed for Gas Fuel Control for the MIT Microengine", by X. Yang, A. Holke, S.A. Jacobson, M.A. Schmidt and S.D. Umans, IEEE/ASME Journal of Microelectromechanical Systems, scheduled for publication in June, 2004

"Progress Toward a Microfabricated Gas Turbine Engine and Generator", S.A. Jacobson, F.E. Ehrich, Y. Gong, J.H. Lang, H.Q. Li, L. Liu, C. Livermore, N. Savoolides, M.A. Schimdt, B. Sirakov, Z. Spakovszky, J.L. Steyn, C. Tan, C.J. Teo, S.D. Umans, L. Wang, D. Ward, and A.H. Epstein, Proceedings: ARL Collaborative Technology Alliance Power & Energy Conference, pp 04.1 – 04.6, Washington, DC, May 4, 2004

"Progress Toward a Microfabricated Gas Turbine Generator for Soldier Portable Power Applications", S.A. Jacobson, S.Das, N. Savoulides, J.L. Steyn, J. Lang, H.Q. Li, C. Livermore, M.A. Schmidt, C.J. Teo, S.D. Umans, A.H. Epstein, D.P. Arnold, J.W. Park, I. Zana and M.G. Allen, to appear in the proceedings of the Army Science Conference, Orlando, FL, November, 2004

"Generating Electric Power with a MEMS Electroquasistatic Induction Turbine-Generator", J.L. Syeyn, S.H. Kendig, R. Khanna, T.M. Lyszczarz, S.D. Umans, C. Livermore and J.H. Lang, Porceedings of the 18'th International Conference on Micro Electro Mechanical Systems, 2005, Miami, FL., pp. 614-617

"Design and Testing of a 1,000-HP High-Temperature Superconducting Motor", V. Dombrovski, D. Driscoll, B. Shoykhet, S. Umans, J Zevchek. IEEE Transactions on Energy Conversion, Vol. 20, No. 3, September, 2005

"Quench in High-Temperature Superconducting Motor Field Coils: Experimental Results", S. Umans and B. Shoykhet , IEEE Transactions on Industry Applications, Vol. 42, No. 4, July/August, 2006

"Quench in High-Temperature Superconducting Motor Field Coils: Experimental Results at 30 K", S. Umans, B. Shoykhet , J. Zevchek, C. Rey, R. Duckworth. IEEE Transactions on Applied Superconductivity, Vol. 17, No. 2, June 2007, pp. 1561-1567

"Quench in High-Temperature Superconducting Motor Field Coils: Computer Simulations and Comparison with Experiments", B. Shoykhet and S. Umans, IEEE Transactions on Applied Superconductivity, Vol. 17, No. 2, June 2007, pp. 1623-1638

"Quench in High-Temperature Superconducting Motor Field Coils: Reduced-Temperature Modeling of HTS Tapes", B. Shoykhet and S. Umans, IEEE Transactions on Applied Superconductivity, Vol. 17, No. 2, June 2007, pp. 3503-3508

"High-Temperature Superconducting Synchronous Motors: Economic Issues for Industrial Applications", R. Schiferl, A. Flory, W. Livoti and S. Umans, IEEE Transactions on Industry Applications, Vol. 44, No. 5, September/October 2008, pp. 1376-1384

"Transient Performance of a High-Temperature-Superconducting Generator", S. Umans, paper presented at the 2009 International Electric Machines and Drives Conference, Miami, Florida, May 3-6, 2009

Other Publications:

"Electric Power Basics: End-Use, Taking the mystery out of electrical energy, power, efficiency and power factor", EPRI, CU.3038R.10.91, published by Electric Power Research Institute, Palo Alto, California, 1991

"Fundamentals of Electric Power - Volume 1: Operating Characterstics and Testing of AC Induction Motors", EPRI TR-202390s, Vol. 1, Project RP 3087-05, Electric Power Research Institute, Palo Alto, California, 1992

"Fundamentals of Electric Power - Volume 2: Energy-Efficient Polyphase AC Induction Motors", EPRI TR-202390s, Vol. 2, Project RP 3087-05, Electric Power Research Institute, Palo Alto, California, 1992

Invited Lectures:

September, l979, "The MIT Superconducting Generator Project", Electrical Engineering and Applied Physics Colloquium Series, Case Western Reserve University.

May, 1990, "Induction Motors", presented to the workshop on Emerging Issues in Motor Technology and Applications sponsored by EPRI and Pacific Gas & Electric, San Ramon, CA

October, 1990, "AC Induction Motor Efficiency'", presented to the 172'nd meeting of the Edison Electric Institute, Electrical System & Equipment Committee, Hartford, Conn.

February, 1991, "The Nature of (60 Hz) Electric and Magnetic Fields", Presented as part of a panel discussion as part of National Engineers Week, Boston Park Plaza - Hotel and Towers, Boston, MA

March, 2005, “Reactive Power. What is it and what good is it?”, Case Western Reserve University, Department of Electrical Engineering and Computer Science seminar series, March, 2005

Patents:

R.H. Lyon, et. al., co-inventors, “Appparatus and Method for Non-Invasive Diagnosis and Control of Motor Operated Valve Condition”, U.S. Patent No. 5,594,175, Jan. 14, 1997

S. Umans and D. Driscoll, co-inventors, “Excitation System for Rotating Synchronous Machines”, U.S. Patent No. 6,362,588, March 26, 2002

S. Umans, “System and Method for Non-Destructive Testing of Rotors”, U.S. Patent No. 7,382,138, June 3, 2008

S. Umans, “Current Measurement Apparatus”, U.S. Patent No. 7,449,877, November 11, 2008

S. Umans, “Protective Link for Superconducting Coil”, U.S. Patent NO. 7,630,179, December 8, 2009