MARCUS O. DURHAM

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MARCUS O. DURHAM

Marcus O. Durham is the Sr. Principal Engineer of THEWAY Corp, Tulsa, OK. This is an engineering, failure analysis, and energy consultant group that supports energy, industrial, commercial, financial, and legal entities with design, research, training, inspections and investigations. He specializes in electrical / mechanical / petro-chemical energy systems, economics / management, and failure analysis. He is also CEO of Pedocs, Inc, a natural resources developer. Professional recognition includes the following.

Life Fellow, Institute of Electrical & Electronics Engineers
Life Fellow, American College of Forensic Examiners Int'l
Life Senior Member, Society of Petroleum Engineers
Diplomate, Am Board of Forensic Engineering &Tech
Licensed Professional Engineer - multiple states
Licensed Electrical Contractor
Licensed Commercial Radiotelephone & Amateur Extra
Certified Fire & Explosion Investigator, NAFI
Certified Vehicle Fire Investigator, NAFI
Certified Homeland Security, ABCHS
Registered Investigator, Am Board of Registered Investigators
Member, Int'l Assoc of Arson Investigators-OK & Nat'l
Member, IEEE Standards Association
Voting Member- Electrical, Nat'l Fire Protection Assoc
Richard H. Kaufmann Medal – IAS / IEEE
Professor Emeritus, University of Tulsa

He has served on and been Chairman of many committees and standards groups within the IEEE, SPE, and API (American Petroleum Institute). He has been a member of the IEEE Committee on Man and Radiation, IEEE Committee on Renewable Energy, and IEEE Petroleum and Chemical Industry Committee.

He has been elected to the grade of IEEE Fellow "for contributions to the theory and application of downhole submersible pumps and power equipment." He has been elected to the grade of Fellow by the American College of Forensic Examiners. He has been awarded the IEEE Richard Harold Kaufmann Medal "for development of theory and practice in the application of power systems in hostile environments."

He was recognized with 6 IEEE Awards for his Standards development work. He has been awarded numerous times for technical papers he has authored. He is acclaimed in Who's Who of American Teachers (multiple editions), National Registry of Who's Who, Who's Who of the Petroleum and Chemical Industry of the IEEE, Who's Who in Executives and Professionals, Who's Who Registry of Business Leaders, Congressional Businessman of the Year, and Presidential Committee Medal of Honor. Honorary recognition includes Phi Kappa Phi, Tau Beta Pi, and Eta Kappa Nu.

Dr. Durham's extensive client list includes the development of a broad spectrum of electrical and facilities projects for both U.S. and international companies. He has a patent for microprocessor measurement of liquids. He has taught numerous courses on safety, electrical, standards, failure analysis, professional practices, and leadership development. He has published seven books, and five eBooks used in university classes and well over 135 papers and articles.

He received the B.S. in electrical engineering from Louisiana Tech University; the M.E. in engineering systems from The University of Tulsa; and the Ph.D. in electrical engineering from Oklahoma State University.

Degrees Earned

BSEE, Louisiana Tech University
Master of Engineering, University of Tulsa
Ph.D., Oklahoma State University

Area of Specialization

failure analysis
lightning & grounding
electrical / mechanical energy conversion
electrical power systems & safety
microcomputer design & applications
petroleum & chemical energy
economics & management

Registration

Professional Engineer – OK, LA, AR, NM, KS
FCC Commercial Radiotelephone Engineer - US
FCC Ham Radio Extra Class - US
Electrical Contractor - OK
Commercial Instrument Pilot - US

Professional Memberships

Institute of Electrical and Electronic Engineers – Fellow
American College of Forensic Examiners International – Life Fellow
Society of Petroleum Engineers – Life Senior Member
American Board of Forensic Engineering and Technology – Diplomate
American Board for Certification in Homeland Security - Certified in Homeland Security
National Association of Fire Investigators – Certified Fire & Explosion Investigator
National Fire Protection Association
International Association of Arson Investigators – OK & Nat'l
Phi Kappa Phi
Tau Beta Pi
Eta Kappa Nu

Honors and Awards

He has been awarded the *IEEE Richard Harold Kaufmann Medal*. This award is presented for outstanding achievement in industrial systems engineering. The prize provides a bronze medal and honorarium. The citation reads "*For development of theory and practice in the application of power systems in hostile environments*."

He has been elected to the grade of *IEEE Fellow* (FIEEE). This is the most prestigious rank in the profession and is recognition of only 1/10 of 1% of the membership. The citation reads: "*For contributions to the theory and application of downhole submersible pumps and power equipment*."

He has been elected to the grade of *Life Fellow* by the American College of Forensic Examiners (FACFEI). This recognition is for work in the investigative sciences. He has been elected to the grade of Diplomate by the American Board of Forensic Engineering and Technology (DABFET). He is also certified in Homeland Security by the American Board for Certification in Homeland Security (CHSIII-ABCHS).

He was elevated to the rank of Life Senior Member by the Society of Petroleum Engineers. This is in recognition of a life-long career contributing to petroleum engineering.

He was appointed to the *Committee on Man and Radiation (IEEE)*. COMAR is the preeminent organization for presenting factual information about potential health effects of electromagnet fields and radiation to the general public. The Committee has scientific credibility, an enormous wealth of expertise in its members, and exists within a major professional organization. Its position papers have been widely influential in presenting a dispassionate analysis of the issues before a wide audience. Members include representatives from IEEE, FDA, USAF, television industry, Lawrence Livermore, EPRI, and others.

Honor Societies

Tau Beta Pi, national engineering honors
Phi Kappa Phi, national academic honors
Eta Kappa Nu, national electrical engineering honors

Professional Recognition

Chairman - Downhole Cable Working Group, IEEE Standards
Chairman - Submersible Cable Working Group, API Recommended Practices
Chairman - Cyclic Load Motors Working Group, IEEE Standards
Chairman - Production Subcommittee, IEEE IAS/PCIC
Chairman - Electric Submersible Pump Standards, API Recommended Practices
Permanent Member - ESP Roundtable Panel, SPE
Member - Petroleum and Chemical Industry Committee, IEEE
Member - Standards Subcommittee, IEEE IAS/PCIC
Member - Synthetic Fuels Working Group, IEEE IAS/PCIC

Member - Safety Committee, IEEE IAS/PCIC
Member - Production Subcommittee, IEEE IAS/PCIC
Member - Energy Storage and Indirect Renewable Technologies Working Group, IEEE Committee on Man and Radiation (COMAR)

He was awarded the *Junior Faculty Research Award for Exemplary Research*.

Dr. Durham has been recognized as one of the leaders in submersible technology. For his contributions of papers and technical service, he has received *eight Society of Petroleum Engineers awards*. Among these are the following.

Permanent Panel, SPE Submersible Pump Round Table
Distinguished Panel Member, SPE Submersible Pump Round Table.
Invited Paper "Submersible Cable Selection and Evaluation Practices" - SPE, Beijing China.
Outstanding Leadership in the Advancement of Submersible Technology

His contributions to submersible technology are also recognized in the American Petroleum Institute. *Four API standards* have been developed based on his work.

Failure Analysis: Dr. Durham has been recognized as an expert and has testified before the Federal Energy Regulatory Commission (FERC), Oklahoma Corporation Commission (OCC), US District Courts, and Oklahoma District Courts.

He has been successfully affirmed in all Daubert hearings in both Federal and State courts. An excerpt from a Daubert Hearing in a District Court of Oklahoma attests to his qualifications.

> "Here we have an expert proffered by the plaintiff, and quite frankly I've been here 17 years in this job alone and I don't know that I've seen a CV or resume or whatever you want to call it that gives better expertise than this fellow has in electrical components, construction, safety, the effect of electric shock on the human system than this fellow has and I'm talking about any expert that's been offered here before me in 17 Years."
> ---Honorable Judge James D. Goodpaster.

Publication Awards

His publications have often successfully competed for *outstanding paper awards* from journals of the Institute of Electrical and Electronic Engineers (PCIC and IAS). This is an international competitive peer review and evaluation of papers that provide a significant contribution to the advancement and understanding of electrical applications.

IAS Magazine: Second Prize of all papers published during year for ""Data Quality and Grounding in Mixed Use Facilities."

PCIC, New Orleans, LA: Prize paper for "Industrial Design Application for Power Distribution over Extra-Long Distances"

PCIC, Philadelphia, PA: Prize paper for "Paradigm Shifts and Impact on Engineers and Industry"

Transactions on Industry Applications, Orlando, FL: Prize Paper for "Lightning, Grounding, and Protection for Control Systems".

PCIC, St. Louis, MO: First place for "Lightning, Grounding, and Protection for Distributed Control and Communications Systems: A Retrofit".

PCIC, Denver, CO: "Grounding System Design for Isolated Locations and Plant Systems".

PCIC, San Antonio, TX: Prize paper for "Safe Work Practices in the Real World".

PCIC, Toronto, Canada: Prize paper for "Electrical, Magnetic, and Biological Effects: A System Model".

Transactions on Industry Applications, Dearborn, MI: Prize paper for "Motor Design Slip Performance".

PCIC, San Diego, CA: First Place for "Comparison of NEMA and Ultra High Slip Motors on Cyclic Loads".

PCIC, Calgary, Canada: Prize Paper for "Optimal Sizing of Motors".

PCIC, Philadelphia, PA: Prize Paper for "Balancing Power Systems Including Creating Three Phase Power from Single Phase for an Induction Generator".

Professional education groups have also recognized his publications for *outstanding paper awards* in recognition of strengthening and improving the classroom learning environment.

American Society of Engineering Education, Manhattan, KS: Prize Paper for "A Senior Design Course That Simulates an Industrial Engineering Environment".

American Society of Engineering Education, Norman, OK: Prize Paper for "A Microprocessor Design Course That Integrates Hardware, Software, and Team Research".

Six awards were presented for work in Chairing numerous editions of different IEEE standards.

Field Testing of Electric Submersible Pump Cable, IEEE RP 1017
Specifying Electric Submersible Pump Cable-Ethylene Propylene Insulation, IEEE RP 1018
Specifying Electric Submersible Pump Cable-Polypropylene Insulation, IEEE RP 1019

He has reviewed articles and papers for:

IEEE Spectrum.

The International Journal of Energy Systems
IEEE Transactions on Industry Applications
International Journal of Modeling and Simulation

Reviewed Publications

"Lightning, Grounding and Protection for Control and Communications Systems Evaluated", Durham, R.A., Durham, M.O. *Institute of Electrical and Electronics Engineers PCIC*, Rome, Italy, June 2011.

"Lightning Dangers on Corrugated Tubing", Durham, R.A., Durham, M.O. *Institute of Electrical and Electronics Engineers PCIC*, San Antonio, Sept 2010.

"CSST Response to Lightning and Transients, A Technical Analysis", Marcus O. Durham and Robert A. Durham, *Fire and Arson Investigator*, IAAI, July 2009.

"What to Do When Things Go Wrong, An Ethical Solution", Robert A. Durham and Marcus O. Durham, *Institute of Electrical and Electronics Engineers PCIC*, Calgary, September 2007.

History and Development of IEEE Standards for Downhole Cable, Marcus O. Durham, Robert A. Durham, Richard Hulett, *IEEE Transactions on Industry Applications*, New York, March/April 2007.

"Data Quality and Grounding in Mixed Use Facilities", Marcus O. Durham and Robert A. Durham, *IEEE Industry Applications Magazine*, May-June 2006.

"Submersible Cable Standards History Newly Revised", Marcus O. Durham, Robert A. Durham, Richard Hulett, *Institute of Electrical and Electronics Engineers PCIC*, September 2005.

"Cathodic Protection Consequences and Standards", Marcus O. Durham and Robert A. Durham, *IEEE Industry Applications Magazine*, January 2005.

"Electric Submersible Pump Grounding", T. R. Brinner, J. D. Atkins, and M. O. Durham, *IEEE Transactions on Industry Applications*, September/October 2004.

"Data Quality and Grounding Considerations for a Petrochemical Facility", Marcus O. Durham and Robert A. Durham, *Institute of Electrical and Electronics Engineers PCIC*, September 2004.

"Covering All the Bases: Industrial Power System Design in a Utility Environment", Robert A. Durham and Marcus O. Durham, *IEEE Industry Applications Magazine*, November/December 2003.

"Corrosion Impact of Cathodic Protection on Surrounding Structures", Robert A. Durham and Marcus O. Durham, *Institute of Electrical and Electronics Engineers PCIC*, September 2003.

"Electric Submersible Pump Grounding, T. R. Brinner, J. D. Atkins, and M. O. Durham, *Institute of Electrical and Electronics Engineers PCIC,* September 2003.

"TVSS Designs," Marcus O. Durham, Karen D. Durham, and Robert A. Durham, *IEEE Industry Applications Magazine*, September/October 2002, pp 31-36.

"Applications Engineering Approach to Maxwell and Other Mathematically Intense Problems", Marcus O. Durham, Robert A. Durham, and Karen D. Durham, *Institute of Electrical and Electronics Engineers PCIC,* September 2002.

"Ground System Design Considerations for Vessels," Marcus O. Durham and Robert A. Durham *IEEE Industry Applications Magazine,* November/December 2001.

"Industrial Design Application for Power Distribution over Extra-Long Distances," Robert A. Durham and Marcus O. Durham, *Institute of Electrical and Electronics Engineers PCIC,* September 2001.

"Transient Voltage Surge Suppression Design and Correlation," Marcus O. Durham, Robert A. Durham, Karen D. Durham *Institute of Electrical and Electronics Engineers PCIC, Institute of Electrical and Electronics Engineers PCIC,* September 2000.

"Electric Re-Regulation Impact," Robert A. Durham and Marcus O. Durham, *IEEE Industry Applications Magazine*, September/October 1999.

"Interaction and Design of Grounded Systems for Tanks and Vessels," Marcus O. Durham, Robert A. Durham, *Institute of Electrical and Electronics Engineers PCIC, Institute of Electrical and Electronics Engineers PCIC,* September 1999.

"What are Standardized Equations for Acceptance of Hi-pot Tests and for Voltage Drop?" Marcus O. Durham, Robert A. Durham, David Anderson, *Institute of Electrical and Electronics Engineers PCIC, Institute of Electrical and Electronics Engineers PCIC,* Indianapolis, September 1998.

"Changing Paradigms for Engineering," Marcus O. Durham and Robert A. Durham, *IEEE Industry Applications Magazine,* Vol 4, Issue 2, March/April 1998, pp 52-60.

"Electric Re-regulation and Effects on Industrial Customers," Robert A. Durham and Marcus O. Durham, *Institute of Electrical and Electronics Engineers PCIC, Institute of Electrical and Electronics Engineers PCIC,* Banff, Canada, September 1997.

"Grounding System Design for Isolated Locations and Plant Systems," Marcus O. Durham, and Robert A. Durham, *IEEE Transactions on Industry Applications,Vol 33, Issue 2, March-April 1997, pp 374-382.* March/April 1998.

"Paradigm Shifts and Impact on Engineers and Industry," Marcus O. Durham and Robert A. Durham, *Institute of Electrical and Electronics Engineers PCIC,* Philadelphia, September 1996.

"Field Test Technology Relationships to Cable Quality," Marcus O. Durham, David H. Neuroth, Kaveh Ashenayi, Thom Wallace, *IEEE Transactions on Industry Applications*, Vol. 31, No.6, Nov/Dec. 1995.

"Grounding System Design for Isolated Locations and Plant Systems," Marcus O. Durham and Robert Durham, *Institute of Electrical and Electronics Engineers PCIC*, Denver, September 1995.

"Lightning, Grounding, and Protection for Control Systems," Marcus O. Durham and Robert Durham, *IEEE Transactions on Industry Applications*, Vol. 31, No. 1, January/February 1995, pp 45-54.

"Can Present Field Test Technology Reasonably Determine Cable Quality?" Marcus O. Durham, David H. Neuroth, Kaveh Ashenayi, Thom Wallace, *Institute of Electrical and Electronics Engineers PCIC*, PCIC-94-, 94CH, September 1994.

"Safe Work Practices: A Real World Implementation," Marcus O. Durham, *IEEE Transactions on Industry Applications,* Vol. 30, No. 1, January/February 1994, pp179-187.

"Harmonic Impact on Power System Design," Marcus O. Durham, Robert D. Strattan, and Dan Carter, *International Journal of Power and Energy Systems*, # 203-1012, February 1994.

"Lightning, Grounding, and Protection for Distributed Control and Communications Systems: A Retrofit," Marcus O. Durham and Robert A. Durham, *Institute of Electrical and Electronics Engineers PCIC*, PCIC-93-, 93CH, September 1993.

"A Universal Systems Model Incorporating Electrical, Magnetic, and Biological Relationships," Marcus O. Durham, *IEEE Transactions on Industry Applications*, Vol. 29, No. 2, March/April 1993, pp 436-446.

"Safe Work Practices in the Real World," Marcus O. Durham, *Institute of Electrical and Electronics Engineers PCIC*, PCIC-92-33, 92CH8186-4, San Antonio, September 1992.

"Electrical, Magnetic and Biological Effects: A Systems Model," Marcus O. Durham, *Institute of Electrical and Electronics Engineers PCIC*, PCIC-91-8, 91CH3057-7 Toronto, September 1991, pp 269-278.

"Correlations of Submersible Cable Performance to Neher-McGrath Ampacity Calculations," Gordon Baker and Marcus O. Durham, *IEEE Transactions on Industry Application*, Vol. 28, No. 2, March 1992, pp 282-286.

"A Flexible Embedded Controller Design for Industrial and Academic Applications," Marcus O. Durham and Dan R. Sossamon, *ISMM Microcomputer Applications*, IASTED 0-88986-176-5, Los Angeles, December 1990.

"NEMA -vs- High Slip Motors," Marcus O. Durham, Clark Lockerd and James F. Lea, *Institute of Electrical and Electronic Engineers IAS*, IAS-90CH2935-9, Spokane, Washington, October 1990, pp 1455-1459.

"Correlations to Neher-McGrath Ampacity Calculation for Submersible Pump Cable," Gordon Baker and Marcus O. Durham, *Institute of Electrical and Electronic Engineers PCIC*, PCIC-90-35, 90CH2923-3, Houston, September 1990, pp 229-234.

"Vibration Failure of Submersible Pumps," Marcus O. Durham, James Williams and Dwight Goldman, *SPE Journal of Petroleum Technology*, Vol. 42, No. 2, February 1990, pp 186-191.

"Motor Design Slip Performance on Cyclic Loads," Marcus O. Durham, Clark Lockerd and James F. Lea, *IEEE Transactions on Industry Applications*, Vol. 26, No. 5, IA 9-15, New York, September/October 1990, pp 919-925.

"NEC Article 725 - Cost Effective Control Wiring," Marcus O. Durham and Clark Lockerd, *IEEE Transactions on Industry Applications*, Vol. 25, No. 5, New York, September/October 1989, pp 901-905.

"Comparison of NEMA and Ultra-High Slip Motors on Cyclic Loads," Marcus O. Durham, Clark Lockerd and James F. Lea, *Institute of Electrical and Electronic Engineers PCIC*, PCIC-89-32, 89CH2777-1, San Diego, September 1989, pp 91-96.

"Effect of Cyclic Loading on Motor Efficiency," Marcus O. Durham and Clark Lockerd, *IEEE Transactions on Industry Applications*, Vol. 24, No. 6, November/December 1988, pp 1153-1159.

"NEC Article 725: Requirement or Loophole," Marcus O. Durham and Clark Lockerd, *Institute of Electrical and Electronic Engineers PCIC*, PCIC-88-3, 88CH2661-7, Dallas, September 1988, pp. 15-19.

"Hysteresis Effect in Cathodic Protection," Marcus O. Durham and Kaveh Ashenayi, *Solar '88*, American Solar Energy Society, Cambridge, MA, June 1988.

"A Composite Approach to Electrical Engineering," Marcus O. Durham, *Institute of Electrical and Electronic Engineers Region V*, 88CH25617-6/000-143, Colorado Springs, CO, March 1988, pp 143-147.

"Power Flow Control Using Two - Port Networks," Marcus O. Durham and Kaveh Ashenayi, *IASTED High Technology in the Power Industry*, Phoenix, AR, March 1988.

"Power System Balancers for an Induction Generator," Marcus O. Durham and R. Ramakumar, *IEEE Transactions on Industry Applications*, PID 87-16, Vol. IA-23, No. 6, New York, November/December 1987, pp 1067 - 1072.

"Application of Two-Port Models for Designing a Balanced Three-Phase Power System," Marcus O. Durham and Kaveh Ashenayi, *IASTED Applied Identification, Modeling and Simulation*, New Orleans, November 1987.

"Power System Balancing: Three Phase from Single Phase," Marcus O. Durham and R. Ramakumar, *Institute of Electrical and Electronic Engineers IAS*, CH2499-2/87/000-1178, Atlanta, October 1987, pp 1178-1184.

"Optimal Sizing of Motors for Beam Pumping Units," Marcus O. Durham and Clark Lockerd, *Institute of Electrical and Electronic Engineers PCIC*, PCIC-87-35, 87CH2495-0, Calgary, September 1987, pp 129-134.

"Solar Powered Cathodic Protection Using Residual Potential," Marcus O. Durham, *IEEE Transactions on Industry Applications*, Vol. IA-23, No.3, New York, May/June 1987, pp 433.

"Two-Port Networks for Analyzing and Balancing Power Systems," Marcus O. Durham, *Institute of Electrical and Electronic Engineers Region V*, 87CH2383-8 CH2383-8/87/0000-0162, Tulsa, March 1987, pp 162-167.

"Three-Phase Induction Generators Applied on Single-Phase Lines," Marcus O. Durham and R. Ramakumar, *Institute of Electrical and Electronic Engineers PCIC*, PCIC-86-32, Philadelphia, 86CH2212-9, September 1986, pp 87-94.

"Hysteresis Permits Battery Free Solar Power for Cathodic Protection," Marcus O. Durham, *Institute of Electrical and Electronic Engineers PCIC*, PCIC-85-62, 85CH2212-9, New York, September 1985.

"Electrical Submersible Pump Cable Standards and Specifications Preview," Marcus O. Durham and Joe Vandevier, *IEEE Transactions on Industry Applications*, Vol. IA-20, Number 5, New York, September/October 1984, pp. 1367-1471.

"Electrical Submersible Pump Cable Standards and Specifications Preview," Marcus O. Durham and Joe Vandevier, *Institute of Electrical and Electronic Engineers PCIC*, PCIC-83-34, 83CH1943-0, Denver, CO, September 1983, pp 239-242.

"Field Testing of Submersible Cable," Marcus O. Durham, Lynn Boyer and Rolf Beer, *IEEE Transactions on Industry Applications*, Vol. IA-16, Number 6, New York, November/December 1980, pp 783-786.

"Downhole Submersible Design - An Electrical System Approach," Marcus O. Durham and Lynn Boyer, *Institute of Electrical and Electronic Engineers PCIC*, PCIC-80-33, 80CH1549-5IA, New York, September 1980, pp. 105-110.

"Field Requirements of Submersible Cable," Marcus O. Durham, Lynn Boyer and Rolf Beer, *Institute of Electrical and Electronic Engineers PCIC*, PCIC-79-33, 79CH1423-3IA, San Diego, CA, September 1979, pp 113-118.

Standards, Books, and Patents

Leadership and Success in Economics, Law, and Technology", Marcus O. Durham, Robert A. Durham, Rosemary Durham; Dream Point Publishers, Tulsa, OK, ISBN 978-0-9719324-7-6.

Leadership and Success in Organizations, Culture, and Ethics", Marcus O. Durham, Robert A. Durham, Rosemary Durham; Dream Point Publishers, Tulsa, OK, ISBN 978-0-9719324-5-X.

Leadership and Success in Relationships and Communications", Marcus O. Durham, Robert A. Durham, Rosemary Durham; Dream Point Publishers, Tulsa, OK, ISBN 978-0-9719324-4-1.

System Design and the 8051, Second Edition, Marcus O. Durham, ISBN 0-9719324-2-5, TechnoPress, Tulsa, OK, 2003

An Intellectual's Argument about God, Marcus O. Durham and Rosemary Durham, ISBN 0-9719324-3-3, Dream Point Publishers, Tulsa, OK, 2003

Micro-controllers in Systems Design, Marcus O. Durham, ISBN 0-9719324-1-7, TechnoPress, Tulsa, OK, 2002

Who Is This God? Marcus O. Durham and Rosemary Durham, ISBN 0-9719324-0-9, Dream Point Publishers, Tulsa, OK, 2002

Electrical Failure Analysis for fire & incident investigations, Dr. M.O. Durham, Dr. R. A. Durham, R Durham, J. A. Coffin, an eBook by Techno-Press, Tulsa, OK

Electrical Systems Fundamentals for Industry, Dr. M.O. Durham, Dr. R. A. Durham, R Durham, J. A. Coffin, an eBook by Techno-Press, Tulsa, OK

Electrical Engineering in a Nutshell, Dr. Robert A Durham, Dr. Marcus O. Durham, an eBook by Dream Point Publishers, Tulsa, OK

Electrical Power Concepts - energy conversion between magnetic, electrical, and mechanical elements, Dr. M.O. Durham, Dr. R. A. Durham, an eBook by Dream Point Publishers, Tulsa, OK

Electrical Engineering Circuit Concepts, Dr. M.O. Durham, Dr. R. A. Durham, an eBook by Dream Point Publishers, Tulsa, OK

Apparatus & Method for Measuring Physical Characteristics of a Liquid, Patent # 5333498, issue date 08/02/94 with A. Brackett.

Electrical Submersible Pump Cable Testing, API 11S6, Marcus O. Durham, Chairman, American Petroleum Institute, Washington, DC, 1994.

Electrical Submersible Pump Cable Applications, API 11S5, Marcus O. Durham, Chairman, American Petroleum Institute, Washington, DC, 1992.

Field Testing of Electric Submersible Pump Cable, IEEE RP 1017-2005, Marcus O. Durham, Chair., Institute of Electrical and Electronic Engineers, New York.

Specifying Electric Submersible Pump Cable-Ethylene Propylene Insulation, IEEE RP 1018-2005, Marcus O. Durham, Chair., Institute of Electrical and Electronic Engineers, New York.

Specifying Electric Submersible Pump Cable-Polypropylene Insulation, IEEE RP 1019-2005, Marcus O. Durham, Chair., Institute of Electrical and Electronic Engineers, New York.

Field Testing of Electric Submersible Pump Cable, IEEE RP 1017-1991, Marcus O. Durham, Chair., Institute of Electrical and Electronic Engineers, New York.

Specifying Electric Submersible Pump Cable-Ethylene Propylene Insulation, IEEE RP 1018-1991, Marcus O. Durham, Chair., Institute of Electrical and Electronic Engineers, New York.

Specifying Electric Submersible Pump Cable-Polypropylene Insulation, IEEE RP 1019-1991, Marcus O. Durham, Chair., Institute of Electrical and Electronic Engineers, New York.

Field Testing of Electric Submersible Pump Cable, IEEE RP 1017-1985, Marcus O. Durham, Chair., Institute of Electrical and Electronic Engineers, New York.

Specifying Electric Submersible Pump Cable-Ethylene Propylene Insulation, IEEE RP 1018-1985, Marcus O. Durham, Chair., Institute of Electrical and Electronic Engineers, New York.

Specifying Electric Submersible Pump Cable-Polypropylene Insulation, IEEE RP 1019-1985, Marcus O. Durham, Chair., Institute of Electrical and Electronic Engineers, New York.

Electrical Systems: Power Safety & Cost Control, Marcus O. Durham, University of Tulsa, Continuing Education, May 1996.

Electrical Safety for Field Operations, Marcus O. Durham, University of Tulsa, Continuing Education, May 1991.

Electrical Submersible Pump Teardown Report, API RP11S1, Marcus O. Durham, Chair., American Petroleum Institute, Washington, DC, 1986

Proceedings & Peer-Reviewed Publications

"Ignition or Shock, Is Grounding the Culprit?" M. O. Durham, R. A. Durham, R. Durham. J. A. Coffin, *Proceedings of 42nd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2010.

"Unraveling the Myths of Low Energy Electrical Ignition" Marcus O. Durham, Robert A. Durham, Curtis Ozment, Jason Coffin, *Proceedings of 42nd Annual Frontiers in Power*

Conference, OSU, Stillwater, OK, October 2009.

"Lightning, Transient & High Frequency Impact on Material Such As Corrugated Tubing" Marcus O. Durham, Robert A. Durham, *Proceedings of 41st Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2008.

"Lightning Damage: An Act of God or Act of Negligence" Marcus O. Durham, Robert A. Durham, Randel Overton, Curtis Ozment, *Proceedings of 40th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2007.

"The Flat Earth Society Perception of Grounding" Marcus O. Durham, Robert A. Durham, *Proceedings of 39th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2006.

"IEEE Standards Development," Robert A. Durham, Marcus O. Durham, Richard Hulett, Oklahoma Society of Professional Engineers, Oklahoma City, June 2006.

"The IEEE Standards Process, A Case Study", Marcus O. Durham & Robert A. Durham, *Proceedings of 38th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2005.

"Engineering Management: A Course For Survival", Marcus O. Durham, Robert A. Durham, & Rosemary Durham, *American Society of Engineering Educators*, Pittsburg, KS 2004.

"Eleven Ground Systems and Connections", Marcus O. Durham & Robert Durham, *Proceedings of 37th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2004.

"Engineering Management, An Oxymoron?", Marcus O. Durham, Robert Durham & Rosemary Durham, *Proceedings of 37th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2004.

"Corrosion and Electrical Safety", Marcus O. Durham & Robert Durham, *Proceedings of 36th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2003.

"Electromagnetics in One Equation Without Maxwell", Marcus O. Durham, *American Association for Advancement of Science - SWARM*, Tulsa, OK, April 2003.

"Microprocessor Design Integration for Real World Control", Marcus O. Durham & Matthew Olson, *Proceedings of 35th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2002.

"Applications Engineers Don't Do Hairy Math", Marcus O. Durham, Robert A. Durham, and Karen D. Durham, *Proceedings of 35th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2002.

"A Microprocessor Design Course That Integrates Hardware, Software, and Team Research", Marcus O. Durham & Matthew Olson, *American Society of Engineering Educators*, Norman, OK, October 2002.

"Data Quality and Grounding Considerations for a Medical Facility", Marcus O. Durham and Robert G. Arnold, *IEEE International Midwest Symposium on Circuits and Systems*, Tulsa, OK, August 2002.

“Tests and Correlations for TVSS”, Marcus O. Durham, Karen Durham, and Robert Durham, *Proceedings of 34th Annual Frontiers in Power Conference,* OSU, Stillwater, OK, October 2001.

“A Senior Design Course That Simulates an Industrial Engineering Environment”, Marcus O. Durham & Theodore W. Manikas, *American Society of Engineering Education*, Manhattan, KS, January, 2001.

"Grounding Systems Interaction," Robert A. Durham and Marcus O. Durham, *Proceedings of 33rd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2000.

"A Cost Effective, Numeric Technique for Projecting Quality of Insulation and Impending Failures," Marcus O. Durham and Robert A. Durham, *Proceedings of 33rd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2000.

"An Engineering Selection for Size of Long Conductors Considering Factors in Addition to NEC," Marcus O. Durham and Robert A. Durham, *Proceedings of 33rd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2000.

“Grounding Systems Interaction,” Robert A. Durham and Marcus O. Durham, *Proceedings of 32nd Annual Frontiers in Power Conference,* OSU, Stillwater, OK, October 1999.

“Can Electrical Insulation and Conductor Performance Be Predicted?” Marcus O. Durham and Robert A. Durham, *Proceedings of Production Operations Symposium*, SPE 52161, Oklahoma City, OK, March 1999

“Engineering Paradigms: Change, Opportunity and Benefit,” Robert A. Durham and Marcus O. Durham, *Proceedings of 31st Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1998.

"Electric Re-regulation and Impact on Users," Robert A. Durham and Marcus O. Durham, *Proceedings of 30th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1997.

"Mitigation Methods for Reducing Extremely Low Frequency Electro-Magnetic Fields," Charles M. Tompkins and Marcus O. Durham, *Proceedings of 29th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1996.

“Hysteresis Effect and Its Application In Cathodic Protection Of Buried Pipelines,” Marcus O. Durham and Kaveh Ashenayi, *Proceedings of Second International Petroleum Environmental Conference,* September, 1995, New Orleans,

“Electrical Submersible Pump Systems Testing Criteria Reference," Marcus O. Durham and James F. Lea, SPE Submersible Conference, Houston, May 1995.

“Compendium of Electrical Submersible Pump Systems Testing Criteria,” Marcus O. Durham and James F. Lea, *Proceedings of Production Operations Symposium*, SPE 29506, Oklahoma City, OK, March 1995

"Remote Transmitter and Distributed Control Grounding and System Protection," Robert A. Durham and Marcus O. Durham, *Proceedings of 27th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1994.

"Application of Back Propagation (BP) Neural Network to Load Forecasting," Jeff Kohlbeck, Kaveh Ashenayi, Marcus O. Durham, *Proceedings of 27th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1994.

"Visualization Of Design Concepts For Electrical Submersible Pumps," Marcus O. Durham, James F. Lea, SPE Submersible Pump Conference, Houston, May 1994.

"Electrical Safety Practices Including Submersible Installations," Marcus O. Durham, SPE Submersible Pump Conference, May 1993.

"Can Cable Test Results Improve Cable Performance in Your Well?", Marcus O. Durham and David Neuroth, SPE Submersible Pump Conference, May 1993.

"Enhancing Performance of Submersibles Operating in Miscible Flood Conditions," Marcus O. Durham and Gerald Miller, *Proceedings of Production Operations Symposium*, SPE 25446, Oklahoma City, OK, March 1993.

"Biological Effects of Electrical and Magnetic Fields: Is It Real?", Marcus O. Durham, Industrial Energy Technology Conference, Houston, TX, March 1993.

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"Submersible Cable Selection and Evaluation Practices,” Marcus O. Durham and Kaveh Ashenayi, China Submersible Pump Workshop, Tianjian China, March 1992, invited paper.

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"Neural Net Based Correction of Power System Distortions Caused by Switching Power Supplies," B. Jayaraman, K. Ashenayi, M. O. Durham, R. D. Strattan, *Proceedings of the First*

International Forum on Applications of Neural Networks to Power Systems, Seattle, Washington, July 23-26, 1991.

"Evaluation and Establishing Safety Ratings for Submersible Cables," M. O. Durham, K. Ashenayi, R. Guzy, J. F. Lea, *Proceedings of Production Operations Symposium*, SPE 21691, Oklahoma City, Oklahoma, April 1991, pp 557-562.

"Embedded Controllers: Key Concepts for a Competitive Environment," Marcus O. Durham and Dan R. Sossaman, IEEE Computers/Automation in Industry, Wichita, KS, October 1990.

"Harmonic Distortion Caused by Switching Power Supplies," Marcus O. Durham and Robert Strattan, *Proceedings of 23rd Frontiers in Power*, OSU, Stillwater, OK, October 1990.

"Microprocessors in System Design: A Course Perspective," Marcus O. Durham, *Modeling and Simulation Conference*, University of Pittsburgh, Pittsburgh, May 1990, pp 1075-1079.

"Electric Power: A Tutorial," Marcus O. Durham, SPE Submersible Pump Roundtable, Houston, TX, May 1990.

"Power Application Research Center's Rating Electric Submersible Pump Cable," Marcus O. Durham, Kaveh Ashenayi and James F. Lea, SPE Submersible Pump Roundtable, Houston, May 1990.

"Study of the Cyclical Performance of Beam Pump Motors," James F. Lea and Marcus O. Durham, Society of Petroleum Engineers, Production Operations, SPE 18827, March 1989, pp 81-88.

"Beam Pump Motors: The Effect of Cyclical Loading on Optimal Sizing," Marcus O. Durham and Clark Lockerd, Society of Petroleum Engineers, Houston, SPE 18186, October 1988.

"Vibration Failure Analysis for Electric Submersible Pumps," Marcus O. Durham, James Williams, and Dwight Goldman, Society of Petroleum Engineers, Dallas, SPE 16924, September 1987.

"The Submersible Pump - It Can Be Compatible with Surface Equipment," Marcus O. Durham and Lynn Boyer, Society of Petroleum Engineers, *Proceedings of Production Operations Symposium*, SPE 9761, Oklahoma City, March 1981, pp. 149-154.

"Submersible Cable Standards Status," Marcus O. Durham, Submersible Pump Conference, Houston, TX, April 1989.

"Pumping Unit Effect on Motor Efficiency," Marcus O. Durham and Clark Lockerd, Southwest Petroleum Short Course, Lubbock, TX, March 1988, pp 308-320.

"Submersible Performance Using Stars and API RP 11S1," Marcus O. Durham, Submersible Pump Conference, Houston, April 1988.

"Power Application Research: Rating Submersible Pump Cable," Marcus O. Durham and Kaveh Ashenayi, Submersible Pump Conference, Houston, April 1988.

"Stars Microcomputer Analysis of Submersible Performance," Marcus O. Durham, SPEMUG Conference, Long Beach, CA, March 1988.

"Vibration Failure Analysis for Electric Submersible Pumps," Marcus O. Durham, James Williams, and Dwight Goldman, Society of Petroleum Engineers, Production Technology Symposium, Lubbock, TX, November 1987.

"Vibration: Cause of Submersible Pump Failures?" Marcus O. Durham, Society of Petroleum Engineers, Submersible Pump Conference, Houston, April 1987.

"Electric Submersible Pumps in Corrosive Environments," Marcus O. Durham, Society of Petroleum Engineers, Submersible Pump Conference, Houston, April 1986.

"Submersible Power Consideration," Marcus O. Durham, Society of Petroleum Engineers, Submersible Pump Conference, Houston, April 1986.

"Waste Gas Used for Small Power Production," Marcus O. Durham and R. Ramakumar, Energy Information Dissemination Seminar, Oklahoma State University, Stillwater, July 1985.

"Oilfield Electrification," Marcus O. Durham, Drilling and Production Institute, University of Kansas Western Regents Center, Liberal, February 1978.

"Use Reliability Analysis to Increase ESP Runlife," Marcus O. Durham and Jim Short, World Oil, Houston, TX, June 1988.

"Microprocessor Control of Enhanced Oil Recovery," Marcus O. Durham, EST Computer Control of the Petroleum Industry, Tulsa, March 1983.

Continuing Education / Short Courses Taught

Electrical Systems
Professional Engineering
Fundamentals of Engineering
High Voltage Electrical Safety - OSHA 1910.269
Electrical Power, Safety, and Cost Control
Electrical Safety for Pumping Operations
OSHA Safety Workshop
Submersible Pump Design
Industrial Electrical Power
Electrical Introduction for Non-Electrical Specialists
Submersible Failure Analysis Short Course
Microcomputer Hardware

Courses Taught at the University of Tulsa

EE 2001	Basic Electrical Measurements Laboratory
EE 2003	Electrical Engineering Science
EE 2161	Digital Design Laboratory
EE 2163	Digital Design
EE 3003	Instrumentation Design
EE 3031	Electric Power Laboratory
EE 3033	Electric Power System
EE 3113	Signals and Linear Systems
EE 3043	Electronics I
ES 3083	Engineering Economy
EE 4053	Modern Controls
EE 4103	Engineering Design, Senior Capstone
EE 4203	Engineering Design II
EE 4133	Power System Design
EE 4143	VLSI Design
EE 4233	Contemporary Power Problems
EE 4263	Microprocessors in Systems Design
EE 6233	Power System Analysis
EE 6263	Microprocessors in Systems Design
EE 7073	Engineering Management
EE 7993	Power System Problems
EE7993	Failure Analysis

Courses Developed

EE 3003	Instrumentation Design
EE 4133	Power System Design
EE 4233	Contemporary Power Problems
EE 4263	Microprocessors in Systems Design

Courses taught at Oklahoma State University include electric power systems, industrial power design, digital design, computer design, and VLSI.

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