Exponent®
Engineering & Scientific Consulting

Ahmad Shahsiah, Ph.D., P.E.

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Professional Profile

Dr. Shahsiah specializes in electrical and electronic systems particularly energy and power systems. He has provided technical consulting services in numerous engineering and scientific areas for over seventeen years.

Dr. Shahsiah has consulted in the areas such as electric utility substation equipment failure, transmission and distribution faults and outage analysis, large generator design reviews, utility wildland fires, environmental impacts and infrastructure hardening, and Electric Vehicle charger stations and utility infrastructures. Dr. Shahsiah has provided on-site consulting services during major events. He has investigated arc-flash events, building electrical system failures, stray voltage effects, vehicle systems, electromagnetic interference, electrical equipment safety, and reliability of SCADA and advanced metering systems. Dr. Shahsiah has provided expert witness testimony in the United States and the International Court of Arbitration.

Dr. Shahsiah's responsibilities at Exponent include conducting studies, performing research and investigating failures related to power equipment and systems in industrial and commercial power systems including medium and high voltage systems, performing passive and active lifetime and reliability and safety evaluations of electrical equipment, and failure analysis of electrical and electronic systems and components including power storage and conversion systems. Prior to joining Exponent, Dr. Shahsiah worked on mathematical and experimental characterization of liquid dielectrics in high voltage devices and published an award-winning Ph.D. dissertation in that area. He has extensive experience in electric power systems including extensive knowledge of power transformers and their liquid dielectric testing, power system analysis and computer modeling, power quality, switching transients and harmonics studies, electric machines and drives, relaying and protection, Distributed Energy Resources integration and code compliance.

Dr. Shahsiah was a lecturer in the California State Universities where he taught Power Systems, and Electric Machines and Drives for nearly seven years. He has taught graduate and undergraduate courses as well as an engineering education course sponsored by the Pacific Gas and Electric Company (PG&E) in collaboration with California State University at East Bay on the topic of Electrical Transmission and Distribution to mostly working professionals in the power industry. Dr. Shahsiah is a senior member of the Institute of Electrical and Electronics Engineers and a member of the California Faculty Association. He has authored more than a dozen technical publications including a book and a book chapter.

Academic Credentials & Professional Honors

Ph.D., Electric Power Engineering, Rensselaer Polytechnic Institute, 2006

M.S., Electric Power Engineering, Rensselaer Polytechnic Institute, 2001

B.S., Electrical Engineering, Amirkabir University of Technology, Iran, 1996

Elected senior member of the Institute of Electrical and Electronics Engineers (IEEE)

Recipient of IEEE Certificates of Appreciation, featured speaker of the San Francisco Power and Energy Society Technical Meetings, March 16, 2009 and September 16, 2015.

Recipient of the Graduate Fellowship Award from the Dielectrics and Electrical Insulation Society (DEIS) of IEEE, October 2005; Department Scholarship Award, Rensselaer Polytechnic Institute, September 2002; Honorary Diploma, Undergraduate School

Licenses and Certifications

Professional Engineer Electrical, California, #18599

Licensed Private Pilot, Federal Aviation Administration, Certificate

Academic Appointments

Lecturer, San Jose State University, Spring 2017-2021

Lecturer, San Francisco State University, Spring 2013-Fall 2016

Professional Affiliations

IEEE, Dielectrics and Electrical Insulation Society—DEIS, 2001-current (member)

IEEE, Power Engineering Society—PES, 2001-current (member)

California Faculty Association

Languages

Farsi

Publications

Shahsiah A. EV Charger Stations and the Utility Role - Latest Developments, Projects and Challenges. Submitted to the DistribuTech Conference & Exhibition, February 2019.

Shahsiah A. Distribution Substation Outage Investigations. Exponent Knowledgebase Website, August 17, 2018.

Shahsiah A, Brown R, Ly M. Reliability and Life Expectancy of Modern SCADA Equipment in Underground Installations. Published in 2017 Resilience Week (RWS) Conference, September 18-22, 2017.

Shahsiah A. Chapter 1: Evolution of the Traditional Power System. D'Andrade Brian W. (Editor), The Power Grid: Smart, Secure, Green and Reliable. Book, ISBN 978-0-12-805321-8, 2017.

Shahsiah A. Mass transfer in electrical insulation of power transformers—Modeling migration of characteristic gases between solid and liquid insulations. Book, ISBN: 978-3-639-09659-0, 2008.

Lindgren S, Shahsiah A, Nabavighadi M. Finding the true meaning of CO2 & CO in power transformers—Separating reality from myth using on-line DGA monitoring. EPRI Substation Equipment Diagnostics Conference, Orlando, FL, March 2-5, 2008.

Shahsiah A, Degeneff RC, Nelson JK. Modeling dynamic propagation of characteristic gases in power transformers oil-paper insulation. IEEE Transactions on Dielectrics and Electrical Insulation 2007; 14(3):710-717, June.

Shahsiah A, Degeneff RC, Nelson JK. A study of the temperature-based dynamic nature of characteristic gases in oil-cellulose insulation systems. IEEE Transactions on Dielectrics and Electrical Insulation 2007; 14(2):471-479, April.

Shahsiah A. Modeling dynamic propagation of characteristic gases in transformer oil/paper structure and transformer fault diagnostics. Doctoral dissertation, Rensselaer Polytechnic Institute, May 2006.

Shahsiah A, Degeneff RC, Nelson JK. A new dynamic model for propagation of characteristic gases in transformer oil-cellulose structure due to temperature variations. IEEE Conference on Electrical Insulation and Dielectric Phenomena, Nashville, TN, October 2005.

Shahsiah A, Degeneff RC, Nelson JK. Modeling dynamic propagation of characteristic gases in power transformers oil/paper structure. EPRI Substation Equipment Diagnostics Conference, New Orleans, LA, March 6-9, 2005.

Woong D, Yu B, Song, Y, Wang A, Liu, Y, Shahsiah A. Discharge and thermal gassing monitoring using fiber acoustic sensors. EPRI Substation Equipment Diagnostics Conference, New Orleans, LA, February 15-18, 2004.

Ward B, Degeneff RC, Shahsiah A. Gases generated from bare electrode at elevated temperatures immersed in mineral oil observed over range of temperature and pressure. EPRI Substation Equipment Diagnostics Conference, San Antonio, TX, February 17-20, 2002.

Presentations

PLAC Presentation: Understanding Failures in Electrical Equipment - More than Just Electrons. September 4, 2019.

IEEE Power Engineering Society Workshop speaker: Plug-in EV Charger Stations - Utility Roles and Trends. San Ramon, California, June 3 and 4, 2019.

IEEE Power Engineering Society San Francisco Chapter speaker: EV Charger Stations and the Utility Role - Developments, Projects and Challenges. San Francisco, California, April 24, 2019.

DistribuTECH 2019 panelist: Why the Time is Now for Electric Vehicles and How Utilities Should Prepare for Them. New Orleans, Louisiana, February 4-7 2019.

IEEE Power Engineering Society Distributed Energy Resources Workshop speaker: Plugin EV charger stations- Utility roles and trends. September 7, 2017.

IEEE Power Engineering Society San Francisco Chapter speaker: Understanding the Electrical Arcing and the Arc-flash Hazard Study. September 16, 2015.

IEEE Industry Application Society San Francisco Chapter speaker: Review of the IEEE Guide for Grounding System Characterization (Std. 81) and Application in Touch and Step Potential Estimation in the Event of an Electrical Short-circuit Fault. San Francisco, California, March 24, 2015.

IEEE Power Engineering Society San Francisco Chapter speaker: Review of the IEEE Guide for Grounding System Characterization (Std. 81) and Application in Touch and Step Potential Estimation in the Event of an Electrical Short-circuit Fault. San Francisco, California. March 18, 2015.

IEEE Power Engineering Society San Francisco Chapter speaker: Condition Monitoring of Power Transformers using Dissolved Gas Analysis (DGA). San Francisco, California, March 16, 2009.

Project Experience

Selected Project Experience

Solar installations, panels, inverters and associated electrical equipment: Failure analysis, life expectancy and testing solar panels and equipment. Managed a multidisciplinary team of electrical engineers and polymer scientists to perform failure analysis and understand extent of conditions of solar equipment failures. This included designing and performing accelerated life testing of panel equipment to study field observations.

Wildfire investigations: Performed numerous electrical engineering investigations related to the wildfire and electrical equipment, including review and analysis of the digitally collected data of the distribution and transmission protective equipment.

International arbitration: Performed studies, developed joint expert statement and testified as expert in front of a tribunal in the international court of arbitration related to the failure of cable-end equipment of an underground utility transmission system.

DC arc-flash safety: Performed quantitative assessment of DC arc-flash hazard in a large traction system (100 kA DC short-circuit level). Studied application of DC fuses to limit DC arc-flash energy. This included developing computer models to estimate the arc current and arc voltage at selected locations within the DC system and estimating the arc clearing time of selected DC fuses.

Utility meter product studies: Assisted a large utility in developing a product that would facilitate low-cost connection to backup power at the utility meter in case of the loss of utility power. This included detail review of the firmware and hardware design to identify and correct issues that were observed during the pilot program.

Climate vulnerability assessment of utility infrastructures: Performed substation equipment vulnerability studies due to climate change for a large utility company. Developed predictive health assessment of the substation transformers and circuit breakers based on the climate projection data and effective age of the assets and compared that with the existing equipment replacement policies and equipment inventory.

Utility transmission and distribution inspections: Study of the Acoustic Ultrasonic technology for application in transmission and distribution line inspections.

DC arc-flash study: Laboratory study of Data Center equipment for potential arc-flash hazard.

Synchronous generators: Generator core evaluations of a 400 MW Hydroelectric generator unit.

Wildfire: Electrical engineering investigations related to Wildfires.

Power transformer failure: Expert testimony: Auxiliary transformer failure in a 300 MW steam turbine power plant.

Arc-flash incident: Expert testimony: 480 Volts industrial-type busway failure.

Electric vehicle charger stations: EV charger station Infrastructure study and utility integration.

Electrical equipment reliability: Reliability and life expectancy study of the SCADA and advanced monitoring equipment used in underground installations of the distribution networks in downtown San

Francisco and Oakland.

Electric utility distribution safety: Equipment grounding evaluations in high-voltage distribution systems including compliance with regulatory standards, interview with field personnel and root-cause investigations.

Electrical Incident investigations: Arc flash incident investigation in an industrial compressor plant including site inspection; arc-flash calculations; review of the safety and maintenance procedures; review of the training programs; interview with relevant personnel; developing recommended corrective actions and providing recommended revisions to the safety and training procedures.

Generator operation and design: Design review of generator unit including study of the generator core design and power generation in leading power factor.

Electric utility substations: Distribution substation outages, root-cause evaluations and suggestions to improve the system reliability.

Patent litigation: Expert testimony: The next generation of liquid dielectrics in high voltage equipment such as power transforms.

Switchgear failure: Investigations, studies and expert reports regarding failure of high voltage substation equipment including failure of 69 kV potential transformer and 12 kV switchgear failure.

Electromagnetic Interference: Experiment design, laboratory testing and field surveys to evaluate the effect of Electromagnetic Interference on electronic systems in vehicles.

Software simulations: Computer simulations using specialized software such as PSpice ® and ETAP ® to support experimental and measured data and to assist forming expert opinion in different cases.

On-site consulting services: Field inspections to evaluate and document the condition of failed devices including power apparatus, building services, and control equipment.

Fire losses: Investigated failure of electrical equipment in the context of fire cause and origin investigations.