

# Hamed Ahmadi Ph.D., P.Eng. | CV

Edmonds 07-6911 Southpoint Dr – Burnaby, BC, Canada V3N 4X8

☎ +1 (778) 710 0165 • ✉ hamed.ahmadi@bchydro.com

## Education

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### The University of British Columbia

*Doctor of Philosophy*

Electrical and Computer Engineering

**Vancouver, Canada**

*2012–2015*

### The University of Tehran

*Masters of Applied Science*

Electrical and Computer Engineering

**Tehran, Iran**

*2009–2011*

### The University of Tehran

*Bachelor of Applied Science*

Specialized in Power Engineering

**Tehran, Iran**

*2005–2011*

## Ph.D. Dissertation

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**Title:** *Distribution Systems Analysis and Optimization*

**Supervisor:** Professor J. R. Martí

**Description:** A comprehensive framework for distribution systems analysis and optimization was developed to accurately model loads, run power flow, and optimize system performance at near-real-time. The proposal is to be used in developing a modern distribution management system (DMS).

## Masters Thesis

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**Title:** *Impacts of large-scale wind farms on power system operation and stability.*

**Supervisors:** Assistant Professor H. Ghasemi & Professor H. Lesani

**Description:** The impacts of wind farms on power system stability and control as well as power system operation were analyzed. Transmission congestion management techniques were developed. The issue of system reduced inertia due to high penetration of wind/solar farms was addressed.

## Bachelors Thesis

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**Title:** *Optimal design of Rogowski coil for partial discharge measurements.*

**Supervisor:** Assistant Professor A. A. Shayegani Akmal

**Description:** Two Rogowski coils were optimally designed and tested in high-voltage lab for partial discharge measurements and high current measurements.

## Work Experiences

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### University of British Columbia

*Adjunct Professor*

**Vancouver, Canada**

*September 2017-Present*

- Capstone Design Course Instructor: supervising six teams of 4-5 students, working on industry-defined projects over two semesters with a fixed budget and deadline.

**British Columbia Hydro***Senior Engineer***Burnaby, Canada***October 2015-Present*

- Overhead transmission line electrical design: radio interference, audible noise, lightning protection, grounding design, electrical clearances, live-line maintenance clearances, electromagnetic fields, corona losses, transposition, switching surges, line surge arresters, insulation coordination, soil resistivity, etc.

**University of British Columbia***Postdoctoral Fellow***Vancouver, Canada***April-September 2015*

- Developed a three-phase linear power flow solution method for distribution systems.

**British Columbia Hydro***Consultant***Burnaby, Canada***January-April 2015*

- Mitigated voltage rise issues in distribution feeders with high penetration of distributed generation.
- Developed a routine to calculate energy loss savings with demand-side management.
- Adopted Real-Time Digital Simulator (RTDS) to verify the operation of protection and control equipment.

**Internships****Meliti Power Plant***Intern***Florina, Greece***Summer 2009*

- Involved in daily activities in the control room of a coal power plant.
- Experienced emergency responses for ramp-up/down, shut-down and start-up.
- Observed the physical operational limits of a real coal power plant.

**Electric Drive Lab***Intern***University of Tehran***Summer 2008*

- Designed dimmable electronic ballasts for fluorescent lamps.
- Learned how to use different lab equipment, working in a group, and writing technical reports.

**Lab Assistant****High-Voltage Lab***Lab Assistant***University of Tehran***2007-2009*

- Supervised 12 students (including 2 international students) for their capstone.
- Participated in several practical projects: high-voltage phase meter, Schering Bridge, igniter for Xenon short-arc lamp, Rogowski coil, and Epstein device.
- Engaged in routine HV testing: insulation withstanding voltage test, transformer lightning and switching surge tests, current transformer short-circuit test, circuit breaker TRV test, etc.
- Learned specific measurement techniques and safety requirements in high-voltage experiments.

**Electric Machines Lab***Lab Assistant***University of Tehran***2009*

- Prepared electric machines for routine lab courses.
- Supervised students in performing a number of laboratory tests.
- Learned about safety measures required in the lab.
- Reviewed lab reports and prepared the list of marks.

**Awards and Recognitions**

- Faculty of Applied Science Graduate Award (\$10,000), University of British Columbia. 2015
- Faculty of Applied Science Graduate Award (\$7,000), University of British Columbia. 2014

- International Partial Tuition Scholarship (\$3,200), University of British Columbia. 2012-2015
- Top 10% undergrad student in electrical engineering (qualified for enrolling in M.Sc. without passing the nationwide entrance exam), University of Tehran. 2009
- Faculty of Engineering Scholarship, University of Tehran. 2008-2009
- Ranked 169 out of 500,000 students in nationwide universities entrance exam. 2005

## Research Grants

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- MITACS Accelerate (\$30,000), University of British Columbia-BC Hydro. Sep.15-Apr.16
- MITACS Accelerate (\$15,000), University of British Columbia-BC Hydro. Jan.15-May15
- Partially Contributed to NSERC Strategic Grant (\$450,000, PI: Dr. José Martí and Dr. Juri Jatskevich), University of British Columbia. 2013-2015

## Computer Skills

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- **Micro-controller programming:** CodeVision, AVR Studio, Proteus, DXP.
- **General programming:** C++, Python, MATLAB.
- **Power engineering:** SES Tools (CDEGS, ROW, HIFREQ), WinIGS, PSCAD, CYMDIST, DSATools (PSAT/TSAT/VSAT), EMTP, PSS®E, COMSOL Multiphysics, ETAP, ASPEN, RSCAD & RTDS.
- **Optimization:** GAMS, AMPL, AIMMS, TOMLAB, CVX.
- **Others:** MS Office, L<sup>A</sup>T<sub>E</sub>X, Photoshop, AutoCAD, Adobe Acrobat Pro.

## Publications

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### Journal papers.....

- [1] **H. Ahmadi**, J. R. Martí, A. V. Meier, "A linear power flow formulation for three-phase distribution systems," *IEEE Transactions on Power Systems*, vol.31, no.6, pp. 5012–5021, 2016.
- [2] **H. Ahmadi**, J. R. Martí, "Load decomposition at smart meters level using eigenloads approach," *IEEE Transactions on Power Systems*, vol.30, no.6, pp. 3425–3436, 2015.
- [3] **H. Ahmadi**, J. R. Martí, H. W. Dommel, "A framework for volt-VAR optimization in distribution systems," *IEEE Transactions on Smart Grid*, vol.6, no.3, pp. 1473–1483, 2015.
- [4] **H. Ahmadi**, J. R. Martí, "Linear current flow equations with application to distribution systems reconfiguration," *IEEE Transactions on Power Systems*, vol.30, no.4, pp. 2073–2080, 2015.
- [5] **H. Ahmadi**, J. R. Martí, "Minimum-loss network reconfiguration: a minimum spanning tree problem," *Sustainable Energy, Grids and Networks*, vol.1, pp. 1–9, 2015.
- [6] **H. Ahmadi**, J. R. Martí, "Mathematical representation of radiality constraint in distribution system reconfiguration problem," *Int. J. Elect. Power & Energy Systems*, vol.64, pp. 293–299, 2015.
- [7] **H. Ahmadi**, J. R. Martí, "Distribution system optimization based on a linear power flow formulation," *IEEE Transactions on Power Delivery*, vol.30, no.1, pp. 25-33, 2015.
- [8] **H. Ahmadi**, H. Ghasemi, "Security-constrained unit commitment with linearized system frequency response constraints," *IEEE Transactions on Power Systems*, vol.29, no.4, pp. 1536–1545, 2014.

- [9] **H. Ahmadi**, H. Lesani, "Transmission congestion management through LMP difference minimization: a renewable energy placement case study," *A. J. Science and Engineering*, vol.39, no.3, pp. 1963–1969, 2014.
- [10] J. R. Martí, **H. Ahmadi**, L. Bashualdo, "Linear power flow formulation based on a voltage-dependent load model," *IEEE Transactions on Power Delivery*, vol.28, no.3, pp. 1682–1690, 2013.
- [11] **H. Ahmadi**, H. Ghasemi, A. M. Haddadi, H. Lesani, "Two approaches to transient stability-constrained optimal power flow," *Int. J. Elect. Power & Energy Systems*, vol.47, pp. 181–192, 2013.
- [12] **H. Ahmadi**, H. Ghasemi, "Maximum penetration level of wind generation considering power system security limits," *IET Generation, Transmission & Distribution*, vol.6, no.11, pp. 1164–1170, 2012.
- [13] **H. Ahmadi**, M. Tasdighi, M. Ansari, M. Mosadeghi, "Probabilistic approach for wind generation placement aiming at congestion management," *Int. Review on Modelling and Simulation*, vol.4, no.4, pp. 1674–1682, 2011.
- [14] **H. Ahmadi**, S. Mohseni, A. A. Shayegani Akmal, "Electromagnetic fields near transmission lines—problems and solutions," *J. Envir. Health Sci. & Eng.*, vol.7, no.2, pp. 181–188, 2010.

#### Conference papers.....

- [1] A. Tavighi, **H. Ahmadi**, M. Armstrong, J. R. Martí, "Discrete-Time Fourier Series to simulate transient overvoltages in power systems," *Proc. International Conference on Power Systems Transients (IPST)*, Perpignan, France, June 2019.
- [2] **H. Ahmadi**, M. Armstrong, A. Tavighi, "Quantifying the shielding effect of trees against lightning strikes for power transmission lines," *Proc. IEEE Canadian Conf. Electrical and Computer Engineering (CCECE)*, Quebec City, QC, Canada, May 2018.
- [3] A. Tavighi, **H. Ahmadi**, M. Armstrong, J. R. Martí, "Optimal phasing for parallel transmission lines to minimize AC interference," *Proc. IEEE Canadian Conf. Electrical and Computer Engineering (CCECE)*, Quebec City, QC, Canada, May 2018.
- [4] **H. Ahmadi**, J. R. Martí, A. Ellis, "Voltage management challenges in feeders with high penetration of distributed generation," *Proc. Canadian Conf. Electrical and Computer Engineering (CCECE)*, Vancouver, Canada, May 2016.
- [5] **H. Ahmadi**, M. Armstrong, "Transmission line impedance calculation using detailed line geometry and HEM soil resistivity measurements," *Proc. Canadian Conf. Electrical and Computer Engineering (CCECE)*, Vancouver, Canada, May 2016.
- [6] **H. Ahmadi**, J. R. Martí, A. Alsubaie, "Sensitivity factors for distribution systems," in *Proc. IEEE PES General Meeting*, Denver, CO, July 2015.
- [7] **H. Ahmadi**, J. R. Martí, "Increasing the limits of allowed distributed generations by volt-VAR control," in *Proc. 4<sup>th</sup> Climate Change Technology Conference*, Montreal, QC, May 2015.
- [8] **H. Ahmadi**, A. Alsubaie, J. R. Martí, "Distribution system restoration considering critical infrastructures interdependencies," in *Proc. IEEE PES General Meeting*, Washington, DC, July 2014.
- [9] **H. Ahmadi**, J. R. Martí, A. Moshref, "Piecewise linear approximation of generators cost functions using max-affine functions," in *Proc. IEEE PES General Meeting*, Vancouver, BC, July 2013.

- [10] **H. Ahmadi**, J. R. Martí, "Power flow formulation based on a mixed-linear and nonlinear system of equations," in *Proc. 13<sup>th</sup> Int. Conf. Envir. Elect. Eng.(EEEIC)*, Wroclaw, Poland, Nov. 2013.
- [11] **H. Ahmadi**, M. Khanabadi, H. Ghasemi, "Transmission system reconfiguration for congestion management ensuring transient and voltage stability," in *Proc. 13<sup>th</sup> Int. Conf. Envir. Elect. Eng.(EEEIC)*, Wroclaw, Poland, Nov. 2013.
- [12] **H. Ahmadi**, B. Asaei, S. Mohseni, "Experimental performance analysis of electronic and magnetic ballasts for fluorescent lamps," in *Proc. 26<sup>th</sup> Int. Power System Conference(PSC)*, Tehran, Iran, 2011.
- [13] **H. Ahmadi**, H. Ghasemi, "Probabilistic optimal power flow incorporating wind power using point estimate method," in *Proc. 10<sup>th</sup> Int. Conf. Envir. Elect. Eng.(EEEIC)*, Rome, Italy, May 2010.
- [14] **H. Ahmadi**, H. Ghasemi, H. Lesani, "A comparative small signal stability analysis of PMSG and SCIG-based wind farms," in *Proc. 25<sup>th</sup> Int. Power System Conference(PSC)*, Tehran, Iran, 2010.
- [15] **H. Ahmadi**, H. Ghasemi, H. Lesani, "Reciprocal impacts of PSS and line compensation on shaft torsional modes," in *Proc. Modern Elec. Power Syst. Symp.(MEPS)*, Wroclaw, Poland, Sep. 2010.
- [16] H. Abniki, A. Majzoobi, H. Monsef, **H. Ahmadi**, H. Dashti, P. Khajavi, "Identifying inrush currents from internal faults using symmetrical components in power transformers," in *Proc. Modern Elec. Power Syst. Symp.(MEPS)*, Wroclaw, Poland, Sep. 2010.

## Research Interests

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- Power system optimization
- Power system control and stability
- Distribution system analysis
- Smart grid technologies
- Integration of renewable energies
- High-voltage engineering

## Teaching/Supervising Experiences

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Instructor.....	
○ Capstone Design Projects: UBC	2017-Present
Teaching Assistant.....	
○ Decision support methods in power systems operation: UBC (Dr. E. Vaahedi)	2013
○ Introduction to electronics and electro-mechanics: UBC (N. Ozog)	2013
○ Power system analysis I & II: UBC (Dr. J. R. Martí)	2012-2014
○ Power system dynamics and stability: University of Tehran (Dr. H. Lesani)	2010
○ Electrical machines I: University of Tehran (Dr. H. Ghasemi)	2010
○ Electronics II: University of Tehran (Dr. A. Afzali-Kusha)	2008
○ Electrical machines II: University of Tehran (Dr. H. Lesani)	2008
○ Electrical machines lab: University of Tehran (Dr. H. Lesani)	2008
○ Engineering mathematics: University of Tehran (Dr. M. Mohammad-Taheri)	2008
Supervising Assistant.....	
○ Capstone projects (8 teams, 36 students): UBC (Dr. M. Wrinch)	2014
○ Capstone projects (1 team, 5 students): BC Hydro-UBC (T. Lee)	2017

## Private Tutoring.....

- Mathematics–High school and university 2010–Present
- A full course on PSCAD: Amir Kabir University of Technology 2011
- An introduction to MATLAB: University of Tehran 2010

## Volunteering

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### Canadian Electricity Association

*Utility Representative* 2018–Present

- Electric and Magnetic Field Working Group

### IEEE Transmission and Distribution Committee

*Utility Participant* 2018–Present

- Development of IEEE Std. 2746: Guide for Evaluating AC Interference on Linear Facilities Co-Located Near Transmission Lines

### Center for Energy Advancement through Technological Innovation (CEATI)

*Utility Representative* 2016–Present

- Grounding & Lightning Interest Group (GLIG).
- Transmission Overhead Design & Extreme Event Mitigation (TODEM)

### Journal Reviewer

*Reviewer* 2012–Present

- IEEE Transactions on Power Systems.
- IEEE Transactions on Energy Conversion.
- International Journal of Electrical Power & Energy Systems.
- IET Generation, Transmission & Distribution.
- British Journal of Applied Science & Technology.
- IET Science, Measurement & Technology.

### Let's Talk Science

**University of British Columbia**

*Volunteer* 2012–2015

- Brockton High School, North Vancouver, BC, Canada. March 2014
  - Active teaching and learning with students involvement on the concept of electric and magnetic fields, building a simple electric motor from scratch, and water electrolysis.
- Four-day school visit, East Kootenay, BC, Canada. October 2013
  - Visited several high/middle schools in Cranbrook and Kimberly to perform simple scientific experiments.
- Four-day school visit, Vancouver Island, BC, Canada. February 2013
  - Visited several high/middle schools in Courtenay and Port Alberni with hands-on activities.
- Two-day science fair, Williams Lake, BC, Canada. April 2012
  - Demonstrated the basic concepts of genetics and DNA using hands-on activities.

### Sci. Tech. Eng. Math. (STEM) Conf.

**University of British Columbia**

*Organizing committee* July 2014

- Coordinated groups of volunteers.
- Provided consultation supports to the conference organizers.

### International graduate students' orientation

**University of British Columbia**

*Super Volunteer* August 2013

- Supervised five volunteers in performing the designated tasks.
- Managed time and resources in real-time practices.

**Int. Conf. Power Systems Transients (IPST)**  
*Organizing committee*

**University of British Columbia**  
*July 2013*

- Organized the conference program, presentation facilities, food distribution, etc.

## Professional Designations

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**Association of Professional Engineers and Geoscientists of BC**  
*Professional Engineer (P. Eng.)*

*2017*

**Institute of Electrical and Electronics Engineers**  
*Member, IEEE*

**Power and Energy Society (PES)**  
*2015*