RAHUL CHAKRABORTY

8 1/2 West Canal Street, Unit 226B, Richmond, VA 23220, USA.
☎ (+1)-919-637-2783 ✉ rahul.chakraborty@dominionenergy.com ✉ rahul06ch@gmail.com

EDUCATION

Doctor of Philosophy in Electrical Engineering August 2017 - February 2023
FREEDM Systems Center, Department of Electrical and Computer Engineering,
North Carolina State University (NCSU), USA. Overall GPA: 4.0/4.0

Masters of Science (Engineering) in Electrical Engineering August 2015 - June 2017
Indian Institute of Science (IISc), Bangalore, India. Overall GPA: 7.0/8.0

Bachelor of Engineering in Electrical Engineering August 2011 - June 2015
Jadavpur University, Kolkata, India. Overall GPA: 9.11/10.0

RESEARCH INTERESTS

Grid integration of renewable energy sources, power system stability analysis using advanced control and optimization techniques, dynamics of large-scale complex systems with critical infrastructure.

EMPLOYMENT

Engineer III March 2023 - Present
Electric Transmission: Strategic Planning and Modeling, Power Delivery Group,
Dominion Energy, Richmond, VA, USA.

Graduate Research and Teaching Assistant August 2017 - February 2023
FREEDM Systems Center, Department of Electrical and Computer Engineering,
North Carolina State University, Raleigh, NC, USA.

Intern May 2020 - August 2020
National Renewable Energy Laboratory (NREL), Golden, CO, USA.

VISITING POSITION

Visiting Researcher June 2019 - July 2019
New York Power Authority (NYPA), White Plains, NY, USA.
Host: Dr. George Stefopoulos.
External advisors: Dr. Aranya Chakrabortty (NCSU), Dr. Evangelos Farantatos (EPRI).
Objective: Worked in Advanced Grid Innovation Lab for Energy (AGILe) as a part of grid modernization project jointly supported by Electric Power Research Institute (EPRI) and NYPA.

TECHNICAL SKILLS

MATLAB, PSCAD, Python, PSS/E, PLECS, PSPICE, ATP-EMTP.

RESEARCH EXPERIENCE

Risk Segmentation and Portfolio Analysis for Pareto Dominance in High Renewable Penetration and Storage Reserves [Sponsor: US Dept. of Energy - ARPA-E] August 2020 - February 2023

- Objective: Performance-based Energy Resource Feedback, Optimization, and Risk Management (PERFORM) approach. Developing optimal power flow (OPF) redesigns for enhancing transient stability limits by tuning wind power injections in New York and Texas transmission systems.
- Advisors: Dr. Aranya Chakrabortty (NCSU), Dr. Joe H. Chow (Rensselaer Polytechnic Institute).

Data-driven Optimal Power Flow (OPF) for Distribution Grids: A Multi-Stage Regression Approach April 2020 - February 2023

- Objective: Developing data driven algorithms to compute the dispatch of distributed energy resources (DERs) for providing ancillary support in distribution systems.
- Advisors: Dr. Md Salman Nazir (Accenture), Dr. Aranya Chakrabortty (NCSU).

Advanced Control Designs and Fast Power Restoration Algorithms for Resilient Distribution Systems May 2020 - August 2020

- Objective: Developed dynamic models of distribution feeders, driving point impedance based system identification algorithms for fast power restoration using Distributed Energy Resources (DERs).
- Advisors (from NREL): Dr. Gab-Su Seo, Dr. Himanshu Jain, Dr. Adarsh Nagarajan.

Hierarchical Control and Information Sharing Methods for Next-Generation Inverter-Interfaced Power Transmission Networks [Sponsor: EPRI] April 2018 - April 2020

- Objective: Developed hierarchical frequency and voltage control algorithms with distributed communication architecture for multi-area power transmission systems with prioritized utilization of area-level Inverter Based Resources (IBRs).
- Advisors: Dr. Aranya Chakrabortty (NCSU), Dr. Evangelos Farantatos (EPRI).

Studies on Polymeric Insulators used for Power Transmission January 2016 - June 2017

- Objective: Proposed new pre-treatment methodology for pollution performance evaluation of High Temperature Vulcanized (HTV) Silicone Rubber (SIR) and investigated the effect of multiple environmental stresses on polymeric insulators.
- Advisor: Dr. Subba Reddy B. (IISc Bangalore).

Economic Generation Scheduling in Microgrid with Pumped-Hydro Unit using Particle Swarm Optimization (PSO) September 2014 - November 2014

- Objective: Developed modified PSO algorithm for optimal operating strategy of a micro grid having conventional generations as well as renewables with storage facilities.
- Advisor: Dr. Swapan Kumar Goswami (Jadavpur University).

PUBLICATIONS

Journal Papers:

J7. **Rahul Chakraborty**, Md Salman Nazir, Aranya Chakrabortty, "*Physics-aware Regression for OPF Dispatch with Topological Reconfigurations of Radial Feeder*", to be submitted to ***IEEE Transactions on Smart Grid*** (manuscript under preparation).

J6. **Rahul Chakraborty**, Aranya Chakrabortty, Denis Osipov, Joe H. Chow, Koushik Kar, "*Risk-Aware Power Flow Optimization Redesign for Enhancing System Operational Limits*", to be submitted to ***IEEE Transactions on Power Systems*** (manuscript under preparation).

J5. **Rahul Chakraborty**, Aranya Chakrabortty, Evangelos Farantatos, Mahendra Patel, Hossein Hooshyar and Atena Darvishi, "*Hierarchical Frequency and Voltage Control using Prioritized Utilization of Inverter Based Resources*", **International Journal of Electrical Power & Energy Systems**, vol. 144: 108527, January, 2023.

J4. **Rahul Chakraborty**, Himanshu Jain and Gab-Su Seo, "*A Review of Active Probing-based System Identification Techniques with Applications in Power Systems*", **International Journal of Electrical Power & Energy Systems**, vol. 140: 108008, September, 2022.

J3. Alok Ranjan Verma, Subba Reddy B. and **Rahul Chakraborty**, "*Multistress Aging Studies on Polymeric Insulators*", **IEEE Transactions on Dielectrics and Electrical Insulation**, vol. 25, no. 2, pp. 524 - 532, April, 2018.

J2. **Rahul Chakraborty** and Subba Reddy B., "*Studies on High Temperature Vulcanized Silicone Rubber Insulators under Arid Climatic Aging*", **IEEE Transactions on Dielectrics and Electrical Insulation**, vol. 24, no. 3, pp. 1751 - 1760, June, 2017.

J1. **Rahul Chakraborty** and Subba Reddy B., "*Performance of Silicone Rubber Insulators under Thermal and Electrical Stress*", **IEEE Transactions on Industry Applications**, vol. 53, no. 3, pp. 2446 - 2454, May - June, 2017.

Papers in Conference Proceedings:

C7. **Rahul Chakraborty**, Md Salman Nazir, Aranya Chakrabortty, "*Data-Driven Optimal Power Dispatch for Distributed Energy Resources in Distribution Networks using Multi-Stage Regression*", accepted for publication in the proceedings of 22^{nd} **IFAC** World Congress, Yokohama, Japan, July, 2023.

C6. **Rahul Chakraborty**, Aranya Chakrabortty, Denis Osipov, Joe H. Chow, "*Power Flow Optimization Redesign for Transient Stability Enhancement*", 14^{th} North American Innovative Smart Grid Technologies (**ISGT**) Conference, Washington, D.C, USA, January, 2023.

C5. **Rahul Chakraborty**, Aranya Chakrabortty, Evangelos Farantatos, Mahendra Patel and Hossein Hooshyar, "*Hierarchical Frequency Control in Multi-Area Power Systems with Prioritized Utilization of Inverter Based Resources*", IEEE PES General Meeting (**PESGM**), Montreal, Canada, 2020. [Selected as **one of the Best Conference Papers** on Power System Dynamics, Control, and Protection]

C4. **Rahul Chakraborty** and Subba Reddy B., "*Investigation on the Pollution Performance of Silicone Rubber Insulator Samples*", 10^{th} Conference of the French Society of Electrostatics (**SFE**), University of Poitiers, France, August, 2016.

C3. **Rahul Chakraborty** and Subba Reddy B., "*Performance of Silicone Rubber Insulators under Thermal and Electrical Stress*", **IEEE IAS** & Electrostatics Society of America (**ESA**) Joint Conference, Purdue University, USA, June, 2016. [Secured **2^{nd} place in Student Paper Competition**]

C2. Sayak Mukherjee, Suprosanna Shit, **Rahul Chakraborty**, Debashis Chatterjee, "*Design and Analysis of Fuzzy Tuned Proportional Resonant Controller for Shunt Active Power Filter using Neutral Point Clamped Multi-level Inverter*", Michael Faraday IET International Summit (**MFIIS**), Kolkata, India, volume 2, page 410 - 416, September, 2015.

C1. Sayak Mukherjee, **Rahul Chakraborty** and Swapan Kumar Goswami, "*Economic Generation Scheduling in Microgrid with Pumped-Hydro Unit using Particle Swarm Optimization*", IEEE International Conference on Electrical, Computer and Communication Technologies (**ICECCT**), Coimbatore, India, volume 1, page 388 - 393, March 2015.

POSTER PRESENTATION

P7. **Rahul Chakraborty**, Aranya Chakrabortty, Denis Osipov, Joe H. Chow and Koushik Kar, "*Optimal Power Flow Redesign for Enhancing Transient Stability Margin*", IEEE PES General Meeting (**PESGM**), Denver, Colorado, USA, July, 2022.

P6. **Rahul Chakraborty**, Aranya Chakrabortty, Denis Osipov, Joe H. Chow and Koushik Kar, "*Optimal Power Flow Design for Enhancing Transient Stability Margin*", ECE Research Symposium, NC State University, January, 2022.

P5. **Rahul Chakraborty**, Aranya Chakrabortty, Evangelos Farantatos, Mahendra Patel and Hossein Hooshyar, "*Hierarchical Frequency and Voltage Control for Transmission Network with Prioritized Renewable Dispatch*", FREEDM Systems Center Research Symposium, NC State University, March, 2021.

P4 **Rahul Chakraborty**, Aranya Chakrabortty, Evangelos Farantatos, Mahendra Patel and Hossein Hooshyar, "*Distributed Hierarchical Architecture for Frequency and Voltage Control with Prioritized Renewable Dispatch*", 4^{th} Grid Science Winter School & Conference, Los Alamos National Laboratory, January, 2021.

P3 **Rahul Chakraborty**, Aranya Chakrabortty, Evangelos Farantatos, Mahendra Patel and Hossein Hooshyar, "*Hierarchical Frequency and Voltage Control with Prioritized Renewable Dispatch*", Energy Week at Duke University, November, 2020. [Received **3^{rd} place in Research Poster Competition**]

P2. **Rahul Chakraborty**, Aranya Chakrabortty, Evangelos Farantatos, Mahendra Patel and Hossein Hooshyar, "*Frequency Regulation in Multi-area Power Systems with Prioritized Utilization of Inverter Based Resources (IBRs)*", FREEDM Research Symposium, NC State University, April, 2019.

P1. **Rahul Chakraborty** and Subba Reddy B., "*Thermal Aging Studies on High Temperature Vulcanized Silicone Rubber Insulators*", EECS Research Students Symposium, Indian Institute of Science, Bangalore, April, 2017. [Received **Best MSc.(Engg.) Poster** award]

ACADEMIC ACHIEVEMENTS

1. Secured **3rd place in Research Poster Competition** in Energy Week at Duke University, USA, November, 2020.
2. Won **Gold Medal** of the Indian Institute of Science, Bangalore for the year 2017-18 for **Best MSc.(Engg.) Thesis** in the Department of Electrical Engineering.
3. Received **Best MSc.(Engg.) Poster** award in EECS Research Students Symposium at Indian Institute of Science, Bangalore, 2017.
4. Secured **2nd place in Student Paper Competition** in Electrostatics Joint Conference held at Purdue University, USA, June, 2016.
5. Secured **6th position with First Class Honours** in Bachelor of Engineering in Electrical Engineering in Jadavpur University, Kolkata, India.
6. Recipient of Ministry of Human Resources and Development, Government of India scholarship for Graduate study.
7. Awarded full-free studentship by Jadavpur University, Kolkata for consecutive two years.

REVIEWING ACTIVITIES

Reviewer for *IEEE Transactions on Power Systems*, *IEEE Transactions on Smart Grid*, *IEEE Transactions on Control Systems Technology*, *IEEE Transactions on Industry Applications*, *IEEE Transactions on Dielectrics and Electrical Insulation*, *IEEE Power and Energy Society General Meeting*, *American Control Conference*.
Link: https://www.webofscience.com/wos/author/record/AFM-8284-2022

REFERENCE

Dr. Aranya Chakrabortty ✉ achakra2@ncsu.edu
Professor, Department of Electrical and Computer Engineering,
FREEDM Engineering Research Center, North Carolina State University, USA.
Currently, Program Director of ECCS Division - Engineering Directorate, National Science Foundation.

Dr. Joe H. Chow ✉ chowj@rpi.edu
Professor, Department of Electrical, Computer, and Systems Engineering,
Rensselaer Polytechnic Institute, USA.

Dr. Gab-Su Seo ✉ gabsu.seo@nrel.gov
Senior Engineer, National Renewable Energy Laboratory, USA.