Mengying Li

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EDUCATION

University of California San Diego, United States September 2013 – August 2018

Ph.D. in Mechanical and Aerospace Engineering , GPA: 3.96/4.0
Advisor: Carlos F. M. Coimbra, Ph.D.
Thesis: "Spectral Modeling of Solar and Atmospheric Radiation for Solar Power Integration"

University of Pennsylvania, United States September 2011 – August 2013

M.S. in Mechanical and Aerospace Engineering , GPA: 3.91/4.0
Advisor: Noam Lior, Ph.D.
Thesis: "Energy and Exergy Analysis and Thermodynamic Optimization of Deep Hot Dry Rock Geothermal Energy Extraction and Power Generation"

Tsinghua University, China August 2007 – June 2011

B.Eng in Building Environment and Equipment Engineering, GPA: 87.4/100
Advisor: Xudong Yang, Ph.D.
Thesis: "Simulation and Experimental Research of Combustion and Heat Transfer Process in Stoves"

RESEARCH INTEREST

Radiative Heat Transfer; Energy Meteorology; Solar Power; Solar Forecasting; Thermal Storage; Renewable Power Systems

JOURNAL PUBLICATIONS

1. **M. Li**, and C. F. M. Coimbra (2019) "Local Thermal Effects Caused by Surface Albedo Replacement of Large Scale Photovoltaic and Concentrated Solar Farms". In preparation to *Journal of Renewable and Sustainable Energy*.
2. Z. Liao, **M. Li** and C. F. M. Coimbra (2019) "Monte Carlo Methods for Thermal Radiation Applications". In preparation to *Progress in Energy and Combustion Science*.
3. D. P. Larson, **M. Li** and C. F. M. Coimbra (2019) "SCOPE: Spectral Cloud Optical Property Estimation from GOES-R Imagery". In preparation to *Journal of Renewable and Sustainable Energy.*
4. **M. Li**, Z. Liao and C. F. M. Coimbra (2019) "Monte Carlo Method for Spectral Solar Irradiance on Inclined Surfaces". In preparation to *Journal of Renewable and Sustainable Energy*.
5. **M. Li**, H. Peterson and Coimbra, C. F. M. (2019) "Radiative Cooling Resource Maps for the Contiguous United States". *Journal of Renewable and Sustainable Energy* (11), 036501.
6. Z. Liao, **M. Li** and C. F. M. Coimbra (2019) "Anisotropic Corrections for the Downwelling Radiative Heat Transfer Flux from Various Types of Aerosols". *International Journal of Heat and Mass Transfer* (136), pp. 1006–1016.

7. **M. Li**, and C. F. M. Coimbra (2019) "On the Effective Spectral Emissivity of Clear Skies and the Radiative Cooling Potential of Selectively Designed Materials". *International Journal of Heat and Mass Transfer* (135), pp. 1053–1062.
8. **M. Li**, Z. Liao and C. F. M. Coimbra (2018). "Spectral model for clear sky atmospheric longwave radiation". *Journal of Quantitative Spectroscopy and Radiative Transfer* (209), 196-211.
9. **M. Li**, Y. Jiang and C. F. M. Coimbra (2017) "On the Determination of Atmospheric Longwave Irradiance under All-Sky Conditions." *Solar Energy* (144), 40-48.
10. Y. Chu, **M. Li** and C. F. M. Coimbra (2016) "Sun-tracking imaging system for intra-hour DNI forecasts." *Renewable Energy* (96), 792-799.
11. **M. Li**, Y. Chu, H. T. C. Pedro and C. F. M. Coimbra (2016) "Quantitative Evaluation of the Impact of Cloud Transmittance and Velocity Derivation on Short-term DNI Forecast." *Renewable Energy* (86), pp.1362-1371.
12. **M. Li** and N. Lior (2015) "Energy analysis for guiding the design of well systems of deep Enhanced Geothermal Systems". *Energy* (93), pp.1173-1188.
13. Y. Chu, **M. Li**, H. T. C. Pedro and C. F. M. Coimbra (2015) "Real-time Prediction Intervals for Intra-hour DNI Forecasts." *Renewable Energy* (83) pp.234-244.
14. **M. Li**, and N. Lior (2015) "Analysis of Hydraulic Fracturing and Reservoir Performance in Enhanced Geothermal Systems." *Journal of Energy Resources Technology*, 137(4), 041203.
15. **M. Li**, H. H. Hu and H. H. Bau (2015). "Range of Validity of a Simplified Model for Diffuse Charge Dynamics." *Electroanalysis*, 27(2), 473-484.
16. **M. Li**, H. H. Hu and H. H. Bau (2015) "Capacitive charging and desalination dynamics of a packed-bed reactor." *Physical Chemistry Chemical Physics*, 17(11), 7181-7195.
17. Y. Chu, H. T. C. Pedro, **M. Li** and C. F. M. Coimbra (2015) "Real-Time Forecasting of GHI and DNI Solar Ramps with Smart Image Processing." *Solar Energy* (114) pp.91-104.
18. **M. Li** and N. Lior (2014) "Comparative Analysis of Power Plant Options for Enhanced Geothermal Systems (EGS)". *Energies*, 7(12), 8427-8445.

CONFERENCE PAPERS AND PRESENTATIONS

Peer-reviewed conference papers and presentations

1. S. Sondur, K. C. Gross, and **M. Li** (2018) "Data Center Cooling System Integrated with Low-Temperature Desalination and Intelligent Energy-Aware Control", *International Green and Sustainable Computing Conference (IGSC18)*, Pittsburgh, PA (Oct. 21-24, 2018).
2. **M. Li**, Z. Liao and C. F. M. Coimbra (2018) "An Efficient Spectral Model for Evaluating Spectral and Spatial Distributions of Clear Sky Atmospheric Longwave Radiation". *Proceedings of the 16th International Heat Transfer Conference*, Beijing, China, pp.8287–8295.
3. K. C. Gross and **M. Li**, "Method for Improved IoT Prognostics and Improved Prognostic Cyber Security for Enterprise Computing Systems". *Proceedings of the 2017 International Conference on Artificial Intelligence.*

Conference presentations

4. **M. Li** and C. F. M. Coimbra (2019) "Daytime Clear-Sky Radiative Cooling Potential Map of the

Contiguous United States", 99th American Meteorological Society annual meeting, January 6-10, 2019, Phoenix, U.S.

5. **M. Li** and C. F. M. Coimbra (2018) "Spectral modeling of the radiative interactions between large scale solar farms and the atmosphere", 100th AGU annual meeting, December 10-14, 2018, Washington DC, U.S.
6. D. P. Larson, **M. Li** and C. F. M. Coimbra (2018) "Direct Spectral Estimation of Cloud Optical Properties from GOES-R Imagery", ASME 2018 International Mechanical Engineering Congress & Exposition, November 10-14, 2018, Pittsburgh, U.S.
7. **M. Li,** Y. Chu, H. T. C. Pedro and C. F. M. Coimbra (2018) "Sky-Imaging Network for Intra-Hour Spatial Solar Forecasts", 98th American Meteorological Society annual meeting, January 7-11, 2018, Austin, U.S.
8. **M. Li** and C. F. M. Coimbra (2018) "Spectral Model for Clear-Sky Longwave Surface Irradiance", 98th American Meteorological Society annual meeting, January 7-11, 2018, Austin, U.S.
9. **M. Li** and N. Lior "Analysis of hydraulic fracturing and reservoir performance in enhanced geothermal systems (EGS)", ASME 2014 International Mechanical Engineering Congress & Exposition, November 14-20, 2014, Montreal, Canada.
10. **M. Li** and N. Lior "Analysis of some power plant options for enhanced geothermal systems (EGS)", 27th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems, June 15-19, 2014, Turku, Finland.
11. **M. Li**, H. H. Hu, and H. H. Bau "Capacitive Charging and Desalination with Porous Electrodes", 66th Annual Meeting of the APS Division of Fluid Dynamics, November 24-26, 2013, Pittsburgh, U.S.

US PATENTS

1. **M. Li** and K. C. Gross "Dequantizing Low Resolution IoT Signals to Produce High-Accuracy Prognostic Indicators." ORA180292 (Disclosure Pending, April 6, 2018).
2. K. C. Gross, **M. Li**, A. P. Wood, S. Jeffreys, A. Misra and L. Fumagalli "High-Fidelity Synthesis of Telemetry Time Series Signals for Expanded ML Research Opportunities." ORA 180260 (Disclosure Pending, March 19, 2018).
3. K. C. Gross, **M. Li**, and D. Gawlick "Multivariate Memory Vectorization Technique to Facilitate Intelligent Caching in Time-Series Databases." ORA 180215 (Disclosure Pending, January 31, 2018).
4. K. C. Gross, Z. H. Liu, D. Gawlick and **M. Li**, "MSET-based Process for Certifying Provenance of Time-Series Data in a Time-Series Database." ORA 180189 (Disclosure Pending, December 20, 2017).
5. K. C. Gross, **M. Li** and T. Masoumi "Bivariate Optimization Technique for Tuning SPRT Parameters to Facilitate Prognostic Surveillance of Sensor Data from Power Plants." ORA180251 (Disclosure Pending, November 28, 2017).
6. K. C. Gross, **M. Li** and A. M. Urmanov "Detecting Degradation in Rotating Machinery by Using the FWHM Metric to Analyze a Vibrational Spectral Density Distribution." ORA180243 (Disclosure Pending, November 22, 2017).
7. K. C. Gross, **M. Li** and A. P. Wood "Hybrid Clustering-partitioning Technique that Optimizes Accuracy and Compute Cost for Prognostic Surveillance of Sensor Data." ORA180084 (Disclosure Pending, November 6, 2017).
8. K. C. Gross, **M. Li** and B. P. Franklin "Optimal Short-term Loadshape Forecasting for Smart Meter

Electricity Signals." ORA180084 (Disclosure Pending, September 26, 2017).

GRANT WRITING EXPERIENCE

1. California Energy Commission, "High-Fidelity Solar Power Forecasting Systems for the 392 MW Ivanpah Solar Plant (CSP) and the 250 MW California Valley Solar Ranch (PV) Project". Carlos F. M. Coimbra (PI). Grant No. EPIC PON-13-303.
   - Contributions: provide preliminary analysis for the potential methods that could achieve the deliverables.
2. Department of Energy, "HAIMOS Ensemble Forecasts for Intra-day and Day-Ahead GHI, DNI and Ramps". Carlos F. M. Coimbra (PI). Grant No. EE0008216.
   - Contributions: provide concept and methods for derive cloud optical properties from remote sensing data.
3. Oracle External Research Office, "Renewable Power and Passive Cooling for Data Centers". Carlos F. M. Coimbra (PI), Kenny C. Gross (co-PI)
   - Contributions: analyze the proposed sustainable system that integrates solar PV power production and radiative cooling.
4. Oracle External Research Office, "Datacenter Cooling System Integrated with Low-Temperature Desalination and Intelligent Energy-Aware Control". Carlos F. M. Coimbra (PI), Kenny C. Gross (co-PI)
   - Contributions: demonstrate one active scheme and one passive scheme for desalination using waste heat from water-cooled datacenters.
5. UC San Diego Frontiers of Innovation Scholars Program, "On the Impacts of Greenhouse Gases, Cloud Cover and Earth Albedo on Solar Energy Resourcing and Global Thermal Balance". Carlos F. M. Coimbra (PI), Lynn M. Russell (co-PI)
   - Contributions: 1st draft of the proposal. Demonstrate the background, the methods of the analysis and proposed outcomes.

TEACHING AND MENTORING

- Department of Mechanical and Aerospace Engineering, UC San Diego
  - Instructor, MAE 256 Radiative Transfer for Energy Applications, Fall 2019 (expected).
  - Instructor, MAE 101C Heat Transfer, Spring 2018 and Spring 2019.
  - Teaching Assistant, MAE 101C Heat Transfer, Fall 2014 and Fall 2015.
  - Teaching Assistant, MAE 221B Mass Transfer, Winter 2015, Winter 2016 and Winter 2017.
  - Mentored students: mentored undergraduate researcher Hannah B. Peterson on the development of radiative cooling potential maps. Mentored graduate researcher Zhouyi Liao on 1-D and 3-D radiative modeling of the atmosphere. Mentored graduate researcher Lysha Matsunobu on analysis of hybrid solar power plants.
- Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania
  - Teaching Assistant, MEAM 203 Thermodynamics, Spring 2012.

PROFESSIONAL ACTIVITIES

Academic Journal Reviewer (December 2015 - present)

- Provide technical reviews to manuscripts submitted to journals *Journal of Renewable and Sustainable Energy*, *Scientific Report*, *Solar Energy*, *Renewable Energy*, *Energy* and *ASME-Journal of Solar Energy*

Engineering.

Outreach activities

- U.S.-China Future Leaders Summer Program, UC San Diego (July 2018, July 2019)
- Expand Your Horizon, University of San Diego (March 2018)
- San Diego High Tech Fair, San Diego (October 2014)

Membership

- American Geophysical Union (October 2018 - present)
- American Meteorological Society (December 2017 - present)

Press Release

- "Which climates are best for passive cooling technologies?" https://techxplore.com/news/2019-06-climates-passive-cooling-technologies.html

HONORS AND AWARDS

- Chinese government award for outstanding self-finance students abroad (USD $6,000), 2019
- UCSD MAE Department Fellowship (USD $60,000), UC San Diego, 2013
- Excellent Thesis Writing of Tsinghua University (5/100), 2011
- Outstanding Academic Performance Scholarship, Tsinghua University (20/90), 2009
- Excellent League Leader of Tsinghua University (8/120), 2009

SKILLS

- Proficiency in English and Mandarin
- Technical Skills
  Heat transfer, power system design and analysis, atmosphere radiative process modelling, remote sensing of clouds, solar forecasting, statistical analysis and data mining, artificial intelligence methods, image processing, signal processing, prognostic analysis, computational fluid dynamics, super capacitor simulation, technical writing and presentation.
- Computer Skills
  Java/C/C++/Python/R/SQL programing, MATLAB, COMSOL, EES, Aspen Plus, Auto CAD, Sketch Up, LaTeX, MS Word, Excel, Access, PowerPoint, Visio

REFEREES

- Prof. Carlos F. M. Coimbra, UC San Diego, ccoimbra@ucsd.edu
- Prof. Noam Lior, University of Pennsylvania, lior@seas.upenn.edu
- Dr. Kenny C. Gross, Oracle Inc, kenny.gross@oracle.com