

# Carleton Coffrin

## EXPERIENCE

### STAFF SCIENTIST

*Advanced Network Science Initiative, Los Alamos National Laboratory (LANL)*  
2016-Present, Los Alamos, New Mexico, USA  
Supervised by Scott Backhaus

### SENIOR RESEARCHER

*Optimisation Research Group, National ICT Australia (NICTA)*  
2015 - 2016, NICTA Victoria, Melbourne, Victoria, Australia  
Supervised by Peter Stuckey

### RESEARCHER

*Optimisation Research Group, National ICT Australia (NICTA)*  
2012 - 2015, NICTA Victoria, Melbourne, Victoria, Australia  
Supervised by Sylvie Thiébaux

### RESEARCH ASSISTANT

*Department of Computer Science, Brown University*  
2008 - 2012, Providence, Rhode Island, USA  
Supervised by Pascal Van Hentenryck

## EDUCATION

### BROWN UNIVERSITY

*Ph.D. in Computer Science*  
2008 - 2012, Providence, Rhode Island, USA  
Thesis: Decision Support for Disaster Recovery through Hybrid Optimization

### *Master of Science in Computer Science*

2008 - 2010, Providence, Rhode Island, USA

### UNIVERSITY OF CONNECTICUT

*Bachelor of Science in Computer Science, Mathematics Minor (Honors, University Scholar)*  
2001 - 2006, Storrs, Connecticut, USA  
Thesis: Cameo Lighting Design Software

### *Bachelor of Fine Arts in Design & Technical Theatre (Honors, University Scholar)*

2001 - 2006, Storrs, Connecticut, USA  
Thesis: Lighting Design for Julius Caesar

## REFERENCES

UPON REQUEST

# Carleton Coffrin

## AWARDS & INVITATIONS

### **PSCC BEST-IN-SHOW JOURNAL EDITION**

*including less than 10% of conference proceedings for Transmission System Restoration with Co-optimization of Repairs, Load Pickups, and Generation Dispatch*  
2014 Power System Computation Conference, Wroclaw, Poland

### **EMOOCs BEST-IN-SHOW JOURNAL EDITION**

*including less than 10% of conference proceedings for The Discrete Optimization MOOC, An Exploration in Discovery-Based Learning*  
2014 European MOOC Stakeholder Summit, Lausanne, Switzerland

### **COURSERA PARTNERS' CONFERENCE PANELIST**

*for Design Strong Assessments in the Discrete Optimization MOOC*  
2014 Coursera Partners' Conference, London, UK

### **OPTIMIZATION ALGORITHMS FOR OPTIMAL POWER FLOW PROBLEMS**

*Finalist (1 of 5) for Heuristic MINLP for Optimal Power Flow Problems*  
2014 Power & Energy Society General Meeting, Washington DC, USA

### **ARPA-E GRID OPTIMIZATION WORKSHOP**

*for Heuristic MINLP for Optimal Power Flow Problems*  
2014 Invitation only ARPA-e Workshop, Washington DC, USA

### **STUDENT POSTER COMPETITION**

*First place for Vehicle Routing for the Last Mile of Power System Restoration*  
2011 Northeast INFORMS Conference, Amherst MA, USA

### **DOING GOOD WITH GOOD O.R. COMPETITION**

*Finalist (1 of 6) for Strategic Planning for Disaster Recovery with Stochastic Last Mile Distribution*  
2010 INFORMS Conference, Austin TX, USA

## GRANTS

### **QPLIB TO QPU**

*Los Alamos National Laboratory, Information Science & Technology Institute*  
\$30,000, proof of concept quantum computer optimization study, 2016  
Project Coordinator: Carleton Coffrin

### **DISCRETE OPTIMIZATION PART 2 (MOOC)**

*University of Melbourne, Teaching and Learning Initiatives Program*  
\$35,000 for course development and technical staff support, 2013  
Project Coordinators: Pascal Van Hentenryck, Carleton Coffrin

### **MODELING DISCRETE OPTIMIZATION (MOOC)**

*University of Melbourne, Teaching and Learning Initiatives Program*  
\$35,000 for course development and technical staff support, 2014  
Project Coordinators: Peter Stuckey, Carleton Coffrin

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## TEACHING

### CO-INSTRUCTOR

*Discrete Optimization MOOC*

2013-Present, University of Melbourne, delivered by Coursera

Instructors: Pascal Van Hentenryck, Carleton Coffrin

### CO-INSTRUCTOR

*Modeling Discrete Optimization MOOC*

2015-Present, University of Melbourne, delivered by Coursera

Instructors: Peter Stuckey, Carleton Coffrin

### GRADUATE TEACHING ASSISTANT

*Design and Analysis of Algorithms*

2010, 2012, Brown University

Instructor: Claire Mathieu

### GRADUATE TEACHING ASSISTANT

*Solving Hard Problems in Combinatorial Optimization: Theory and Systems*

2010, 2012, Brown University

Instructor: Pascal Van Hentenryck

### GUEST LECTURES

2015, Australian National University

2014 - 2015, Monash University

2012 - 2015, University of Melbourne

2012, Brown University

2010, Los Alamos National Laboratory

## PROFESSIONAL SERVICE

### TASK FORCE CHAIR

Benchmarks for Validation of Emerging Power System Algorithms, 2016

IEEE Power & Energy Society, Power System Operations Committee

### STUDENT SYMPOSIUM CHAIR

28<sup>th</sup> Australasian Joint Conference on Artificial Intelligence, 2015

### PROGRAM COMMITTEE

21<sup>st</sup> European Conference on Artificial Intelligence, 2014

Doctoral Program, Principles and Practice of Constraint Programming, 2015

### REVIEWER

IEEE Transactions on Power Systems 2012-2016, Smart Grid 2014-2016

PSCC 2016 \* AAI 2014, 2015 \* IJCAI 2013, 2015 \* CP 2011

### NESTA - CURATION AND MAINTENANCE

The most comprehensive and accurate archive of AC power network data

### STAC - DESIGN AND DEPLOYMENT

A web-based visualization tool for AC power network data

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## PUBLICATION OVERVIEW

### GOOGLE SCHOLAR

[scholar.google.com.au/citations?user=IEu32BQAAAAJ](https://scholar.google.com.au/citations?user=IEu32BQAAAAJ)

Citations 565 \* H-index 13

Refereed Journal Articles: 7

Refereed Conference Papers: 24

## REFEREED JOURNAL ARTICLES

### ***Strengthening the SDP Relaxation of AC Power Flows with Convex Envelopes, Bound Tightening, and Lifted Nonlinear Cuts***

Carleton Coffrin, Hassan Hijazi, Pascal Van Hentenryck

IEEE Transactions on Power Systems, forthcoming, 2016

### ***The QC Relaxation: A Theoretical and Computational Study on Optimal Power Flow***

Carleton Coffrin, Hassan Hijazi, Pascal Van Hentenryck

IEEE Transactions on Power Systems, volume 31, number 4, 2016

### ***Transmission System Repair and Restoration***

Pascal Van Hentenryck, Carleton Coffrin

Mathematical Programming, volume 151, issue 1, 2015

### ***Transmission System Restoration: Co-optimization of Repairs, Load Pickups, and Generation Dispatch***

Carleton Coffrin, Pascal Van Hentenryck

International Journal of Electrical Power & Energy Systems, volume 72, 2015

### ***Convex Quadratic Relaxations of Mixed-Integer Nonlinear Programs in Power Systems***

Hassan Hijazi, Carleton Coffrin, Pascal Van Hentenryck

Mathematical Programming Computation, in press, 2014

### ***A Linear-Programming Approximation of AC Power Flows***

Carleton Coffrin, Pascal Van Hentenryck

INFORMS Journal on Computing, volume 26, number 4, 2014

### ***Solving Steel Mill Slab Problems with Constraint-Based Techniques: CP, LNS, and CBL***

Pierre Schaus, Jean-Noel Monette, Laurent Michel, Pascal Van Hentenryck, Carleton Coffrin, Yves Deville

Journal of Constraints, volume 16, number 2, 2011

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## REFEREED CONFERENCE PAPERS

### ***Network Flow and Copper Plate Relaxations for AC Transmission Systems***

Carleton Coffrin, Hassan Hijazi, Pascal Van Hentenryck

Submitted to the Power Systems Computation Conference (PSCC), Genoa, Italy, 2016

### ***Polynomial SDP Cuts for Optimal Power Flow***

Hassan Hijazi, Carleton Coffrin, Pascal Van Hentenryck

Submitted to the Power Systems Computation Conference (PSCC), Genoa, Italy, 2016

### ***Strengthening Convex Relaxations with Bound Tightening for Power Network Optimization***

Carleton Coffrin, Hassan Hijazi, Pascal Van Hentenryck

Principles and Practice of Constraint Programming (CP), Cork, Ireland, 2015

### ***Predicting success: how learners' prior knowledge, skills and activities predict MOOC performance***

Gregor Kennedy, Carleton Coffrin, Paula de Barba, Linda Corrin

Proceedings of Learning Analytics and Knowledge (LAK), Poughkeepsie NY, USA, 2015

### ***Primal and Dual Bounds for Optimal Transmission Switching***

Carleton Coffrin, Hassan Hijazi, Karsten Lehmann, Pascal Van Hentenryck

Proceedings of the Power Systems Computation Conference (PSCC), Wroclaw, Poland, 2014

### ***Transmission Network Expansion Planning: Bridging the Gap between AC Heuristics and DC Approximations***

Russell Bent, Carleton Coffrin, Rodrigo Gumucio, Pascal Van Hentenryck

Proceedings of the Power Systems Computation Conference (PSCC), Wroclaw, Poland, 2014

### ***Power System Restoration Planning with Standing Phase Angle and Voltage Difference Constraints***

Terrence Mak, Carleton Coffrin, Pascal Van Hentenryck, Ian A. Hiskens, David Hill

Proceedings of the Power Systems Computation Conference (PSCC), Wroclaw, Poland, 2014

### ***Visualizing patterns of student engagement and performance in MOOCs***

Carleton Coffrin, Linda Corrin, Paula de Barba, Gregor Kennedy

Proceedings of the Learning Analytics and Knowledge (LAK), Indianapolis IN, USA, 2014

### ***Teaching Creative Problem Solving in a MOOC***

Pascal Van Hentenryck, Carleton Coffrin

Proceedings of the Special Interest Group on Computer Science Education (SIGCSE), Atlanta GA, USA, 2014

### ***The Discrete Optimization MOOC, An Exploration in Discovery-Based Learning***

Carleton Coffrin, Pascal Van Hentenryck

Special invitation to eLearning Papers from the eMOOCs Conference, Lausanne, Switzerland, 2014

### ***Planning with MIP for Supply Restoration in Power Distribution Systems***

Sylvie Thiébaux, Carleton Coffrin, Hassan Hijazi, John K. Slaney

23rd International Joint Conference on Artificial Intelligence (IJCAI), Beijing, China, 2013

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## REFEREED CONFERENCE PAPERS

### ***Joint Assessment and Restoration of Power Systems***

Pascal Van Hentenryck, Nabeel Gillani, Carleton Coffrin

20th European Conference on Artificial Intelligence (ECAI), Montpellier, France, 2012

### ***Last-Mile Restoration for Multiple Interdependent Infrastructures***

Carleton Coffrin, Pascal Van Hentenryck, Russell Bent

26th AAAI Conference on Artificial Intelligence (AAAI), Toronto, Canada, 2012

### ***Accurate Load and Generation Scheduling for Linearized DC Models with Contingencies***

Carleton Coffrin, Pascal Van Hentenryck, Russell Bent

Power & Energy Society General Meeting (PES), San Diego CA, USA, 2012

### ***Approximating Line Losses and Apparent Power in AC Power Flow Linearizations***

Carleton Coffrin, Pascal Van Hentenryck, Russell Bent

Power & Energy Society General Meeting (PES), San Diego CA, USA, 2012

### ***Randomized Adaptive Vehicle Decomposition for Large-Scale Power Restoration***

Ben Simon, Carleton Coffrin, Pascal Van Hentenryck

Integration of A.I. and O.R. Techniques in C.P. for Combinatorial Optimization Problems (CPAIOR), 2012

### ***Water Distribution Expansion Planning with Decomposition***

Russell Bent, Carleton Coffrin, David Judi, Tim McPherson, Pascal van Hentenryck

14th Water Distribution Systems Analysis Conference (WDSA). Adelaide, Australia, 2012

### ***Optimizing index deployment order for evolving OLAP***

Hideaki Kimura, Carleton Coffrin, Alexander Rasin, Stanley B. Zdonik

15th International Conference on Extending Database Technology (EDBT), Berlin, Germany, 2012

### ***Vehicle Routing for the Last Mile of Power System Restoration***

Pascal Van Hentenryck, Carleton Coffrin, Russell Bent

Power Systems Computation Conference (PSCC), Stockholm, Sweden, 2011

### ***Strategic Stockpiling of Power System Supplies for Disaster Recovery***

Carleton Coffrin, Pascal Van Hentenryck, Russell Bent

Power & Energy Society General Meeting (PES), Detroit MI, USA, 2011

### ***Spatial and Objective Decompositions for Very Large SCAPs***

Carleton Coffrin, Pascal Van Hentenryck, Russell Bent

Integration of A.I. and O.R. Techniques in C.P. for Combinatorial Optimization Problems (CPAIOR), 2011

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## REFEREED CONFERENCE PAPERS

### ***Strategic Planning for Disaster Recovery with Stochastic Last Mile Distribution***

Pascal Van Hentenryck, Russell Bent, Carleton Coffrin

Integration of A.I. and O.R. Techniques in C.P. for Combinatorial Optimization Problems (CPAIOR), 2010

### ***Constraint-Based Local Search for the Automatic Generation of Architectural Tests***

Pascal Van Hentenryck, Carleton Coffrin, Boris Gutkovich

Principles and Practice of Constraint Programming (CP), Lisbon, Portugal, 2009

### ***Optimizing Network Deployment of Formally-Specified Distributed Systems***

Carleton Coffrin, Laurent D. Michel, Alexander A. Shvartsman, Elaine L. Sonderegger, Pascal Van Hentenryck

Software Engineering and Data Engineering (SEDE), Las Vegas NV, USA, 2009