Dr. Guangning Tan

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OBJECTIVES Software developer, computational scientist, data analyst

SUMMARY Highly motivated PhD in Computational Science and Engineering with over 7 years' experience in numerical analysis and scientific computing/programming. Extensive knowledge in data structure, algorithms, and C++/MATLAB software development. Comprehensive technical writing skills and meticulous attention to details. Strong abilities to collaborate with team members on multi-disciplinary projects and work independently. Passionate about learning and acquiring new skills.

EXPERIENCE

Postdoctoral associate, Massachusetts Institute of Technology, Cambridge, MA, US **Jan. 2017–present**

- Collaborated with former postdocs, PhDs, and researchers in Process Systems Engineering Lab to develop software, theory, and numerical methods in dynamic systems
- Designed the software architecture of PERKS (Parameter Estimation in Reaction Kinetic Systems) and its GUI in Excel to be delivered to Novartis pharmaceutical company in May 2017

Technical editing assistant, Cardiff University, Wales, UK **Sept. 2016–Dec. 2016**

- Assisted Prof Pryce from Cardiff in drafting the proposal of MANDAE (Modeling and Advanced Numerics for Differential-Algebraic Equations), an international research project proposed to the European Horizon 2020 programme

Research assistant, McMaster University, Ontario, Canada **Sept. 2016–Dec. 2016**

- Collaborated with Prof Nedialkov and Prof Pryce on developing numerical C++/MATLAB code for solving differential-algebraic equations (DAEs), specifically those in mechanical systems
- Supervised two Master students on developing C++ code for automatic differentiation (AD)

  (1) Extended AD package FADBAD++ to multiple precision

  (2) Adopted incremental computation to improve AD in our DAE solver; achieved speedups > 10

Research assistant, McMaster Centre for Software Certification, Canada **Jan. 2016–Aug. 2016**

- Participated in McMaster and Fiat-Chrysler Automobiles (FCA) Leadership in Automotive Powertrain embedded software project; collaborated with McMaster and FCA research scientists
- Improved optimization algorithms for solving the motor torque determination problem

Research assistant, EnviroSim Associates Ltd., Hamilton, ON, Canada **Sept. 2015–Mar. 2016**

- Developed C++ code to accelerate wastewater process model simulations in BIOWIN simulator

Teaching assistant, Department of Computing & Software, McMaster University

- Taught most of the tutorials; led other TAs and coordinate with them, students and instructors
- Scientific Computation (SE/CS 4X03) **2013, 2014, 2016**
- Machine-Level Programming (SE/CS 3F03) **2012, 2013, 2014**
- Signals and Systems (SE 3MX3) **2015**

Education

McMaster University, Hamilton, Ontario, Canada

PhD of Computational Science and Engineering **Jan. 2012–Aug. 2016**

- Thesis: Conversion methods for improving structural analysis of DAEs. Slides
- GPA: 12.0/12.0 during PhD, overall 11.7/12.0 during all graduate programs

Master of Computational Science and Engineering **Sept. 2010–Dec. 2011**

- Project: DAESA, a MATLAB package for structural analysis of DAEs

Sun Yat-sen University, Guangzhou, Guangdong, China

Bachelor of Communication and Electrical Engineering **Sept. 2006–June 2010**

Selected Publications

- *How automatic differentiation can help solve differential-algebraic equations*. Submitted to Optimization Methods and Software, 2017. 19 pages
- *Conversion methods for improving structural analysis of differential-algebraic equation systems*. BIT Numerical Mathematics, 2017. 20 pages
- *Algorithm 948: DAESA: a MATLAB tool for structural analysis of differential-algebraic equations: Software*, ACM Trans. Math. Softw., 41 (2015), pp. 12:1–12:14. 15 pages
- DAESA: *a MATLAB tool for structural analysis of differential-algebraic equations: Theory*, ACM Trans. Math. Softw., 41 (2015), pp. 9:1–9:20. 20 pages
- See my curriculum vitae for a complete list of publications

Software

DAESA, Differential-Algebraic Equation Structural Analyzer in MATLAB

- http://www.tgn3000.com/daesa.html

DAETS 1.2 (under development), a C++ numerical package solving DAEs by Taylor Series

- http://www.cas.mcmaster.ca/~nedialk/daets/

Honors and Awards

First awards in the 2015 and 2016 CSE Student Symposia for best presentation	2015, 2016
Best Teaching Assistant awarded by McMaster Software Engineering Club	2015
McMaster International Excellence Award	2012–2016
McMaster Internal Award Scholarship (Dalley Fellowship)	2012–2014
Student excellence scholarship at Sun Yat-sen University	2007, 2008

Technical Skills

- Languages: Matlab, C/C++, Fortran, LaTeX, Java, Python, Perl, Ruby
- Systems: Windows (Vista, 7, 8, and 10), Linux (Ubuntu), Unix (MacOS)
- Software: GNU Scientific Library, SVN, Git, Microsoft Office
- Research expertise: Numerical Analysis, Scientific Computing/Programming, Software Development/Documentation, Data Structure and Algorithms
- Research focus: Structural Analysis of DAEs, Automatic Differentiation, Computer Algebra

Languages

Cantonese, Mandarin (native), English (fluent), Japanese (basic), French (basic)

Interests

Contract bridge, basketball, music, Japanese, programming, teaching, technology