

David Craig Penner

Curriculum Vitae

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in davidcraigpenner

My research is focused on investigating, and potentially improving, the properties of high-order generalized summation-by-parts operators and methods in the context of problems of increasing practical relevance, for example, fluid flow problems governed by the compressible Navier-Stokes equations.

Education

- 2016/9–present **University of Toronto Institute for Aerospace Studies**, Toronto, ON.
Ph.D., Aerospace Engineering, Sept 2021 (Expected)
Advisor: Professor David W. Zingg
Direct transfer from M.A.Sc. to Ph.D.
- 2011/9–2016/5 **University of Saskatchewan**, Saskatoon, SK.
B.Sc., Mechanical Engineering, May 2016
Great Distinction

Experience

Research

- 2016/9–present **Graduate Student Researcher**, University of Toronto, Toronto, ON.
Project: Development and investigation of efficient high-order generalized summation-by-parts operators for computational fluid dynamics
Advisor: Professor David W. Zingg
- 2014/5–2014/8 **Undergraduate Student Researcher**, University of Saskatchewan, Saskatoon, SK.
Project: Investigate the effect of Chromium on diamond deposition on ferrous substrates using microwave plasma chemical vapor deposition
Advisor: Professor Qiaoqin Yang

Industry

- 2015/5–2015/8 **Student Field Engineer**, PCL Construction, Regina, SK.
 - Created a set of interactive, electronic construction drawings
 - Supervised and directed subcontractors
 - Received the highest student performance rating upon completion of work term
- 2013/5–2013/8 **Engineering Technologist**, Ground Engineering Consultants Ltd., Regina, SK.
 - Conducted concrete sampling and concrete cylinder strength testing
 - Performed foundation inspections
 - Completed topographic surveys
- 2016/5–2016/8 **Farm Hand**, Schiller Organics, Regina, SK.
 - Completed construction projects (carpentry and sheet metal)
 - Operated and maintained heavy farm machinery
 - Completed welding projects

Scholarships, honours, and awards

2017/9–2020/8	NSERC Alexander Graham Bell Doctoral Scholarship	105 000 CAD
2018/7	International Summer School Scholarship, Beijing, China	9000 CNY
2017/9–2020/1	University of Toronto Fellowship	34 000 CAD
2017/6	International HPC Summer School Scholarship, Boulder, Colorado	935 CAD
2016/9–2017/8	NSERC Alexander Graham Bell Master's Scholarship	17 500 CAD
2016/9	Mary H. Beatty Fellowships	5000 CAD
2016/5	University of Saskatchewan M.Sc. Scholarship (Declined)	17 000 CAD
2016/3	Most Innovative Mechanical Engineering 4 th Year Capstone Design Project	
2016/3	3 rd place – Most Innovative 4 th Year Capstone Design Project	75 CAD
2016/1	Nortek Air Solutions Canada Award	2000 CAD
2016/1	Douglas Durie Memorial Fund	1000 CAD
2016/1	University of Saskatchewan Scholarships	3000 CAD
2015/1	Douglas Durie Memorial Fund	2000 CAD
2015/1	W. R. (Buck) Staples Scholarship	2300 CAD
2015/1	University of Saskatchewan Scholarships	3000 CAD
2014/5–2014/8	NSERC Undergraduate Student Research Award	5625 CAD
2012/9–2016/5	Dean's Honour Roll in Engineering	
2012/9–2013/4	David Dube and Heather Ryan Huskies Men's Football Award	4300 CAD
2011/9–2012/4	Huskie Football Foundation Awards	4000 CAD

Journal publications (refereed)

- [2] D. A. Craig Penner and D. W. Zingg, "Superconvergent Functional Estimates from Tensor-Product Generalized Summation-by-Parts Discretizations in Curvilinear Coordinates," *Journal of Scientific Computing*, vol. 82, Feb. 2020. DOI: 10.1007/s10915-020-01147-7.
- [1] X. Sun, H. Ma, L. Yang, M. Sanchez-Pastén, D. Craig Penner, Y. Li, and Q. Yang, "Metal Dusting, Carburization and Diamond Deposition on Fe-Cr Alloys in CH₄-H₂ Plasma Atmospheres," *Corrosion Science*, vol. 98, pp. 619–625, Sep. 2015. DOI: 10.1016/j.corsci.2015.06.001.

Conference proceedings (refereed)

- [2] D. A. Craig Penner and D. W. Zingg, "Generalized Summation-by-Parts Methods: Coordinate Transformations, Quadrature Accuracy, and Functional Superconvergence," in *AIAA Aviation 2019 Forum*, Dallas, Texas: American Institute of Aeronautics and Astronautics, Jun. 2019. DOI: <https://doi.org/10.2514/6.2019-2952>.
- [1] D. A. Craig Penner and D. W. Zingg, "High-Order Artificial Dissipation Operators Possessing the Summation-by-Parts Property," in *2018 Fluid Dynamics Conference*, Atlanta, Georgia: American Institute of Aeronautics and Astronautics, Jun. 2018. DOI: 10.2514/6.2018-4165.

Presentations (excluding the above proceedings)

- [3] D. A. Craig Penner, A. L. Marchildon, K. J. Mattalo, S. Shadpey, and D. W. Zingg, “Novel High-Order Summation-by-Parts Methods for Computational Fluid Dynamics,” Poster presentation, *1st Computational Science and Engineering Symposium*, University of Toronto Institute for Aerospace Studies, Toronto, Ontario, Canada, May 2019.
- [2] D. A. Craig Penner, “High-Order Artificial Dissipation Operators Possessing the Summation-by-Parts Property,” Oral presentation, *2018 International Graduate Summer School in Aeronautics and Astronautics*, Beihang University, Beijing, China, Jul. 2018.
- [1] D. A. Craig Penner, “Development and Investigation of Efficient High-Order Generalized Summation-by-Parts Operators for Computational Fluid Dynamics,” Oral presentation, *2017 International High-Performance Computing Summer School*, University of Colorado Boulder, Boulder, Colorado, United States of America, Jun. 2017.

Teaching

Fall 2017 **Graduate Teaching Assistant**, Fundamentals of Computational Fluid Dynamics
 2018 (AER 1316H), University of Toronto.
 2019 *Instructor*: Professor David W. Zingg
Responsibilities: marking, guest lecturer

Mentoring

Assisted in the supervision of the following students

2018/5–2018/8 **Alireza Razavi**, Bachelor of Applied Science, University of Toronto.
Project: Applying optimized summation-by-parts operators to cut cell nodal distributions
 2018/5–2018/8 **Edward (Jun Tai) Luo**, Bachelor of Applied Science, University of Toronto.
Project: Optimal boundary closures for high-order artificial dissipation operators satisfying the summation-by-parts property

Computer skills

underline denotes extensive use

Languages	<u>Fortran</u> , <u>MATLAB</u> , Python, C++	Environments	<u>UNIX terminal</u> , <u>Windows</u>
Software	SolidWorks, ICEM CFD, Tecplot	Microsoft	<u>Excel</u> , <u>Word</u> , <u>PowerPoint</u>

Professional memberships

2017/11–present *Student Member*, American Institute of Aeronautics and Astronautics (AIAA)

Other activities

2011/9–2013/8 **Athlete**, *University of Saskatchewan Huskies Men’s Football Team*, Saskatoon, SK.
 Competed with the University of Saskatchewan Football Team for two years.