Curriculum Vitae[1]

BENJAMIN W. ONG

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RESEARCH INTERESTS

High Performance Scientific Computing: Parallel-in-time, Domain Decomposition, Boundary-Integral Methods, Fast-Summation Treecodes, Moving Mesh Methods, Numerical Linear Algebra, Dimension Reduction

EDUCATION AND TRAINING

Simon Fraser University,	Mathematics,	Ph. D.	2007
Simon Fraser University,	Mathematical Physics,	B. Sc.	2000

APPOINTMENTS

8/21 – present	Associate professor, Department of Mathematical Sciences Michigan Technological University
1/15 – 8/21	Assistant Professor, Department of Mathematical Sciences Michigan Technological University
7/18 – 6/19	Data Science Program Director Michigan Technological University
1/14 – 12/14	Director of Research, Institute for Cyber Enabled Research Michigan State University
8/11 –12/13	Research Specialist, Institute for Cyber Enabled Research Michigan State University
8/10–8/11	Visiting Assistant Professor, Department of Mathematics Michigan State University
8/07–8/10	Post Doctoral Fellow, Department of Mathematics Michigan State University

PUBLICATIONS

1. N. Mudiyanselage, J. Blazejewski, **B. Ong** and **C. Piret**, (2022) A Radial Basis Function - Finite Difference and Parareal Framework for Solving Time Dependent Partial Differential Equations, Dolomites Research Notes on Approximation 15(5):8–23

[1] updated September 2022

2. J. Azzam, D. Henderson, **B. Ong** and A. Struthers, (2022) Quasi-Newton Optimization with Hessian Samples, arXiv:2201.02608, (PDF)

3. D. Henderson, **B. Ong** and A. Struthers, (2022) BlockOpt.jl (Software), (DOI)

4. (2021) Parallel-in-Time Integration Methods (2021), Editors: **B. Ong**, J. Schroder, J. Shipton, S. Friedhoff (DOI)

5. J. Azzam, **B. Ong** and A. Struthers, (2021) Randomized Sub-Sampled Methods for Matrix Approximation, *Machine Learning, Optimization and Data Science*, 226–240

6. **B. Ong** and J. Schroder, (2020) Applications of Time Parallelism, *Computing and Visualization in Science*, 23:11, doi:10.1007/s00791-020-00331-4 (PDF)

7. **B. Ong** and R. Spiteri, (2020) Deferred Correction methods for ODEs, *Journal of Scientific Computing*, 83(3):1–29, doi:10.1007/s10915-020-01235-8, (PDF)

8. **B. Ong** and S. Dhamankar, (2020) Towards an adaptive treecode for N-body problems, *Journal of Scientific Computing*, 82(3):1-12, doi:10.1007/s10915-020-01177-1 (PDF)

9. F. Kwok and **B. Ong**, (2019) WRAP: Waveform Relaxation with Adaptive Pipelining, SIAM Journal on Scientific Computing, 41(1):A339-A364, doi:10.1137/17M115311X (PDF)

10. **B. Ong** and B. Mandal, (2018) Pipeline Implementations of Neumann-Neumann and Dirichlet-Neumann Waveform Relaxation Methods, *Numerical Algorithms*, 78(1):1-10, doi:10.1007/s11075-017-0364-3 (PDF)

11. **B. Ong**, A. Christlieb, and B. Quaife, (2017) A new family of regularized kernels for the harmonic oscillator, *Journal of Scientific Computing*, 71:1212 doi:10.1007/s10915-016-0336-0, (PDF)

12. A. Christlieb, Y. Cheng, W. Guo and **B. Ong**, (2017) An asymptotic preserving Maxwell Solver resulting in the Darwin Limit of Electrodynamics, *Journal of Scientific Computing*, 71:959 doi:10.1007/s10915-016-0328-0, (PDF)

13. M. Iwen and **B. Ong**, (2016) A distributed and Incremental SVD algorithm for Agglomerative Data Analysis on Large Networks, *SIAM Matrix Analysis and Applications*, 37(4):1699–1718 (PDF)

14. R. Haynes, K. Ladd and **B. Ong**, (2016) Algorithm 965: RIDC Methods - A Family of Parallel Time Integrators, *ACM TOMS*, 43(Aug):8:1–8:13 doi:10.1145/2964377 (PDF)

15. S. High, F. Kwok and **B. Ong**, (2016) Pipeline Schwarz Waveform Relaxation, Domain Decomposition Methods in Science and Engineering XXII, Lecture Notes in Computational Science and Engineering, Springer-Verlag, 179-187, doi:10.1007/978-3-319-18827-0_36 (PDF)

16. A. Christlieb, C. Macdonald, **B. Ong** and R. Spiteri, (2015) Revisionist Integral Deferred Correction with Adaptive Error and Stepsize Control, *Comm. Math. Sci.*, 10(1):1–25, doi:10.2140/camcos.2015.10.1 (PDF)

17. M. Causley, A. Christlieb, **B. Ong**, L. Van Groningen, (2014) Method of Lines Transpose: An implicit solution to the wave equation, *Mathematics of Computation*, 83:2763–2786, doi:10.1090/S0025-5718-2014-02834-2 (PDF)

18. R. Haynes and **B. Ong**, (2013) MPI-OpenMP algorithms for the parallel space-time solution of Time Dependent PDEs, Domain Decomposition Methods in Science and Engineering XXI, Lecture Notes in Computational Science and Engineering, Springer-Verlag (PDF)

19. **B. Ong**, R. Russell and S. Ruuth (2012), An h-r moving mesh method for one dimensional time dependent PDEs, Proceedings of the 21st International Meshing Roundtable, 39–54, doi://10.1007/978-3-642-33573-0_3 (PDF)

20. A. Christlieb, A. Melfi and **B. Ong** (2012), Parallel Semi-Implicit Time Integrators, arXiv:1209.4297v1, (PDF)

21. A. Christlieb, R. Haynes and **B. Ong** (2012), A parallel space–time algorithm, *SIAM J. Sci. Comput*, 34(5):233–248, doi://10.1137/110843484 (PDF)

22. A. Christlieb and **B. Ong** (2011), Parallel implicit time integrators, *J. Sci. Comput*, 49(2):167–179, doi:10.1007/s10915-010-9452-4, (PDF)

23. A. Christlieb, M. Morton, **B. Ong** and J. Qiu (2011) Semi-implicit integral deferred correction using high order additive Runge–Kutta integrators, *Comm. Math. Sci.*, 9(3):879-902, (PDF)

24. A. Christlieb, C. Macdonald, and **B. Ong** (2010), Parallel high-order integrators, *SIAM J. Sci. Comput*, 32(2):818-835, doi:10.1137/09075740X, (PDF)

25. J. Qiu, **B. Ong** and A. Christlieb (2010), Integral deferred correction methods constructed with high order Runge-Kutta Methods, *Math. Comp.*, 79:761-783, 2010, doi:10.1090/S0025-5718-09-02276-5, (PDF)

26. A. Christlieb, **B. Ong** and J. Qiu (2009) Comments on high order integrators embedded within integral deferred correction methods, *Comm. Appl. Math and Comp. Sci.*, 4(1):27-56, (PDF)

27. J. Barber, C. Bose, A. Bourlioux, J. Braun, E. Brunelle, T. Garcia, T. Hillen and **B. Ong** (2008) Burning issues with PROMETHEUS, the Canada's wildfire growth simulator, *Canadian Applied Mathematics Quarterly*, 16(4):337-378, (PDF)

MENTORING

Undergraduates: A. Melfi (2010–2012); K. King (2010–2011); M. McQuiston (2011–2012); J. Fila (2012–2013); K. Ladd (2011–2014); K. Stankowski (2015); J. Prewett (2015); M. Herringa (2016); N. Judge (2017 – 2018); A. Marcich (2017 – 2019); S. Dhamankar (2017 – 2020); N. Milam (2020 – 2021); D. Rosales (2021 – 2022); D. Miller (2023); L. DeZeeuw (2023)

Graduate: Dr. M. Morton (PhD, graduated 2011, co-advised with A. Christlieb); Dr. L. Van Groningen (PhD, graduated 2012, co-advised with A. Christlieb); S. High (Masters, graduated 2014); E. Novak (Project, Summer 2015); A. Alazigg (Project, Fall 2015); S. Judge (Project, Fall 2017); D. Thanawala (Masters, Spring 2019); N. Naidu (Project, Spring 2019); S. Potluri (Project, Spring 2019); S. Rao (Project, Spring 2019); I. Gowda (Project, Spring 2019); S. Nagula (Project, Spring 2019); Dr. J. Azzam (PhD, graduated 2020, co-advised with A. Struthers); S. Nimmigadda (Project, Spring 2020); J. D. Brandwie (2022–2023); P. Hettige (2019–present); S. Sahani (2021–present);

Post Doctoral Fellows: Dr. K. Wang (2013–2014); Dr. B. Mandal (2015–2016)

Thesis committee: B.Franklin (2015 – 2018); M. Roberts (2017 – 2019); F. Yosof (2018); P. Khairnar (2018 – 2020); Z. Zhao (2020)

TEACHING I have taught a wide variety of courses at the various academic institutions I have been affiliated with. They are listed in reverse chronological order, starting with my recent teaching assignments at Michigan Tech. Instructor ratings at Michigan Tech are based on a scale of 1 (poor) – 5 (excellent). Scores are not available (n/a) if the enrollment has fewer than three students.

- Spring 2023, MA 1600 – "Introduction to Scientific Simulation"
- Spring 2022, MA 2160 – "Calculus II with technology"
- Spring 2022, MA 3990 – "Iterative Linear Solvers" (n/a)
- Spring 2022, MA 4990 – "AD Tools for Optimization" (n/a)
- Fall 2022, MA 4620 – "Numerical PDEs" (4.71/5)
- Fall 2022, MA 2600 – "Scientific Computing" (4.82/5)
- Spring 2022, MA 1600 – "Introduction to Scientific Simulation" (4.5/5)
- Spring 2022, MA 1161 – "Calculus I with technology" (4.34/5)
- Fall 2021, MA 2600 – "Scientific Computing" (4.91/5)
- Fall 2021, MA 1160 – "Calculus I with technology" (4.12/5)
- Fall 2021, CM 5100 – "Applied Mathematics for Chemical Engineers" (4.16/5)
- Spring 2021, MA 4610 – "Numerical Linear Algebra" (4.17/5)
- Fall 2020, MA 2600 – "Scientific Computing" (4.73/5)
- Fall 2020, MA 1160 – "Calculus I with technology" (4.37/5)
- Spring 2020, MA 5580 – "Parallel Time Integration" (4.82/5)

- Fall 2019, MA 2600 – "Scientific Computing" (4.33/5)
- Fall 2019, MA 1160 – "Calculus I with technology" (4.48/5)
- Spring 2019, MA 1600 – "Introduction to Scientific Simulation" (4.72/5)
- Fall 2018 MA 2600 – "Scientific Computing" (4.78/5)
- Fall 2018, UN 5550 – "Introduction to Data Science" (4.5/5)
- Spring 2018, MA 5580 – "Computational Plasma Physics" (n/a)
- Spring 2018, MA 4900 – "Finding Structure in Data" (n/a)
- Spring 2018, MA 3521 – "Differential Equations" (3.29/5)
- Spring 2018, MA 1600 - "Introduction to Scientific Simulations" (n/a)
- Fall 2017, MA 2600 – "Scientific Computing" (4.5/5)
- Spring 2017, MA 1600 – "Introduction to Scientific Simulations" (4.85/5) (exceptionally student evaluations recognized by university)
- Fall 2016, MA 3520 – "Differential Equations" (3.6/5)
- Fall 2016, MA 5629 – "Numerical PDEs" (5/5)
- Spring 2016, MA 1600 – "Introduction to Scientific Simulations" (4.5/5)
- Spring 2015, MA 1600 – "Introduction to Scientific Simulations" (4.4/5)

At my post-doctoral institution, Michigan State university, instructor ratings are based on a scale of 1 (poor) – 4 (excellent).

- Fall 2009, MTH 451 – "Numerical Analysis" (3.3/4)
- Fall 2008, MTH 451 – "Numerical Analysis" (3.2/4)
- Fall 2008, MTH 132 – "Calculus I" (3.0/4)

At my Alma Mater, Simon Fraser University, I taught large-section (150+ students) pre-calculus several times. I was also a teaching instructor for continuous optimization, fluid dynamics, numerical analysis, boundary value problems. I did not keep good records of my teaching evaluations in my early career unfortunately.

COMPLETED GRANTS / AWARDS

NSF *CBMS Conference: Parallel Time Integration*,
01/01/2020 – 12/31/2021, $36,636, role: PI, Co-PI: Jacob Schroder

NSF *9th Parallel-In-Time Workshop*,
10/15/2019 – 09/30/2021, $25,185, role: PI, Co-PI: Jacob Schroder

(05/18 – 08/18) Research mentor for two students who received "Summer Research Undergraduate Fellowships" (SURF, $4,000 each)

(2016–2017) XSEDE Resource Allocation (compute resources, approximately $6,500 in value) Agglomerative Data Analysis on Large Networks, role: PI

(2016) IMA PI Summer Graduate Program, *Finite Element Methods for Eigenvalue Problems* $17,610 role: Co-PI, PI: Jiguang Sun, Co-PIs: Mark Gockenbach, Benjamin Ong and Allan Struthers

(2016) IAS Travel Award Travel, *The Mathematics of Data*, $5,000, role: PI

(2012–2015) Air Force Office of Scientific Research, *Fault Tolerant Paradigms*, $677,129, role: PI, Co-PIs: Andrew Christlieb and Yang Wang

(2015) Jackson Learning Grant, *Introduction to Scientific Simulations*, $1,000, role: PI

(2015) IMA Travel Grant, $750

(2011–2012) NVIDIA Teaching Center Award, $12,000, Role: co-PI, PI: Andrew Christlieb

(2011–2012) XSEDE Allocation (200,000 CPU hours, $\sim \$20,000$, role: PI