

Bruno Turcksin

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🌐 Turcksin

Employment History

- March 2017 – Present **Computational Scientist** in the Computational Sciences and Engineering Division at Oak Ridge National Laboratory, Oak Ridge, TN.
- January 2016 – March 2017 **Postdoctoral Research Associate** in the Computer Science and Mathematics Division at Oak Ridge National Laboratory, Oak Ridge, TN.
- January 2014 – December 2015 **Visiting Assistant Professor** in the Department of Mathematics at Texas A&M University, College Station, TX.
- January 2013 – December 2013 **Postdoctoral Researcher** in the Department of Mathematics at Texas A&M University, College Station, TX.
- August 2008 – December 2012 **Graduate Research Assistant** in the Department of Nuclear Engineering at Texas A&M University, College Station, TX.
- July 2009 – August 2009 **Intern** at Oak Ridge National Laboratory, Oak Ridge, TN.
Worked in a team on development of a parallel computational framework for coupled electron-photon transport.
- April 2008 – August 2008 **Intern** at Texas A&M University, College Station, TX.
Developed a 3D mesh adaptive time dependent code for neutron and photon transport.
- January 2007 – February 2008 **Intern** at Tractebel Engineering, Brussels, Belgium.
Worked on probabilistic safety assessment for an air regulation circuit.
- September 2006 – June 2007 **Teaching Assistant** for a sophomore-level course of Mechanics at Université Libre de Bruxelles, Brussels, Belgium.

Education


















- 2008 – 2012 **Ph.D. in Nuclear Engineering** at Texas A&M University, College Station, Tx.
Thesis: Acceleration Techniques for Discrete-Ordinates Transport Methods with Highly Forward-Peaked Scattering. Development and implementation of an angular multigrid solver for the electron-photon transport in a deterministic transport code.
- 2009 **European Master of Science in Nuclear Engineering.**
- 2003 – 2008 **Master in Engineering Physics** at Université Libre de Bruxelles, Brussels, Belgium.
Five-year college degree with "Grande Distinction" (High Honors).






Skills

- Languages** **French:** native speaker
English: fluent
Dutch: basic
- Computer Skills** **Languages:** C++, Python, CMake
Software: Matlab, VisIt, svn, git
Libraries: Kokkos (developer), deal.II (developer), Trilinos, MPI, numpy, scipy
Operating Systems: Linux, FreeBSD
- Teaching** **Math 308:** Differential Equations, Spring 2014

Research Publications

Journal Articles

- 1 D. Arndt, W. Bangerth, M. Bergbauer, *et al.*, “The deal.II Library, Version 9.5,” *Journal of Numerical Mathematics*, vol. 31, pp. 231–246, 3 Aug. 2023.  DOI: <https://doi.org/10.1515/jnma-2023-0089>.
- 2 D. Arndt, W. Bangerth, M. Feder, *et al.*, “The deal.II Library, Version 9.4,” *Journal of Numerical Mathematics*, vol. 30, pp. 231–246, 3 Jul. 2022.  DOI: <https://doi.org/10.1515/jnma-2022-0054>.
- 3 C. R. Trott, D. Lebrun-Grandié, D. Arndt, *et al.*, “Kokkos 3: Programming model extensions for the exascale era,” *IEEE Transactions on Parallel and Distributed Systems*, vol. 33, pp. 805–817, 4 Apr. 2022.  DOI: <https://doi.org/10.1109/TPDS.2021.3097283>.
- 4 D. Arndt, W. Bangerth, B. Blais, *et al.*, “The deal.II Library, Version 9.3,” *Journal of Numerical Mathematics*, vol. 29, pp. 171–186, 3 Sep. 2021.  DOI: <https://doi.org/10.1515/jnma-2021-0081>.
- 5 D. Arndt, W. Bangerth, D. Davydov, *et al.*, “The deal.II finite element library: Design, features, and insights,” *Computers & Mathematics with Applications*, vol. 47, pp. 407–422, Jan. 2021.  DOI: <https://doi.org/10.1016/j.camwa.2020.02.022>.
- 6 D. Lebrun-Grandié, A. Prokopenko, **B. Turcksin**, and S. R. Slattery, “ArborX: A Performance Portable Geometric Search Library,” *ACM Transactions on Mathematical Software*, vol. 47, 2:1–2:15, 1 Mar. 2021.  DOI: <https://doi.org/10.1145/3412558>.
- 7 D. Arndt, W. Bangerth, T. C. Clevenger, *et al.*, “The deal.II Library, Version 9.2,” *Journal of Numerical Mathematics*, vol. 28, pp. 131–146, 3 Jul. 2020.  DOI: <https://doi.org/10.1515/jnma-2020-0043>.
- 8 M. L. Pasini, **B. Turcksin**, W. Ge, and J.-L. Fattebert, “A parallel strategy for density function theory computations on accelerated nodes,” *Parallel Computing*, vol. 100, 2 Dec. 2020.  DOI: <https://doi.org/10.1016/j.parco.2020.102703>.
- 9 D. Arndt, W. Bangerth, T. C. Clevenger, *et al.*, “The deal.II Library, Version 9.1,” *Journal of Numerical Mathematics*, vol. 27, pp. 203–213, 4 Jun. 2019.  DOI: <https://doi.org/10.1515/jnma-2019-0064>.
- 10 A. Ghesmati, W. Bangerth, and **B. Turcksin**, “Residual-based a posteriori error estimation for hp-adaptive finite element methods for the Stokes equations,” *Journal of Numerical Mathematics*, vol. 27, pp. 237–252, 4 Dec. 2019.  DOI: <https://doi.org/10.1515/jnma-2018-0047>.
- 11 G. Alzetta, D. Arndt, W. Bangerth, *et al.*, “The deal.II Library, Version 9.0,” *Journal of Numerical Mathematics*, vol. 26, pp. 173–183, 4 Dec. 2018.  DOI: <https://doi.org/10.1515/jnma-2018-0054>.
- 12 D. Arndt, W. Bangerth, D. Davydov, *et al.*, “The deal.II Library, Version 8.5,” *Journal of Numerical Mathematics*, vol. 25, pp. 137–145, 3 Sep. 2017.  DOI: <https://doi.org/10.1515/jnma-2017-0058>.
- 13 W. Bangerth, T. Heister, L. Heltai, *et al.*, “The deal.II Library, Version 8.3,” *Archive of Numerical Software*, vol. 4, pp. 1–11, 100 Jan. 2016.  DOI: <https://dx.doi.org/10.11588/ans.2016.100.23122>.
- 14 W. Bangerth, T. Heister, L. Heltai, *et al.*, “The deal.II Library, Version 8.4,” *Journal of Numerical Mathematics*, vol. 24, pp. 135–141, 3 Oct. 2016.  DOI: <https://dx.doi.org/10.1515/jnma-2016-1045>.
- 15 **B. Turcksin**, M. Kronbichler, and W. Bangerth, “WorkStream - A Design pattern for Multicore-Enabled Finite Element Computations,” *ACM Transactions on Mathematical Software*, vol. 43, 2:1–2:29, 1 Aug. 2016.  DOI: <https://doi.org/10.1145/2851488>.
- 16 W. Bangerth, T. Heister, L. Heltai, *et al.*, “The deal.II Library, Version 8.2,” *Archive of Numerical Software*, vol. 3, pp. 1–8, 100 2015.  DOI: <https://doi.org/10.11588/ans.2015.100.18031>.
- 17 **B. Turcksin**, T. Heister, and W. Bangerth, “Clone and graft: Testing scientific applications as they are built,” *arXiv:1508.07231*, 2015.  DOI: <https://doi.org/10.48550/arXiv.1508.07231>.

- 18 **B. Turcksin** and J. C. Ragusa, “Discontinuous diffusion synthetic acceleration for S_n transport on 2D arbitrary polygonal meshes,” *Journal of Computational Physics*, vol. 274, pp. 356–369, Oct. 2014.  DOI: <https://doi.org/10.1016/j.jcp.2014.05.044>.
- 19 W. Bangerth, T. Heister, L. Heltai, *et al.*, “The deal.II Library, Version 8.0,” *arXiv::1312.2266v3*, 2013.  DOI: <https://doi.org/10.48550/arXiv.1312.2266>.
- 20 W. Bangerth, T. Heister, L. Heltai, *et al.*, “The deal.II Library, Version 8.1,” *arXiv::1312.2266v4*, 2013.  DOI: <https://doi.org/10.48550/arXiv.1312.2266>.
- 21 **B. Turcksin**, J. C. Ragusa, and J. E. Morel, “Angular Multigrid Preconditioner for Krylov-based Solution Techniques applied to the S_n Equations with Highly Forward-Peaked Scattering,” *Transport Theory and Statistical Physics*, vol. 41, pp. 1–22, 1–2 Aug. 2012.  DOI: <https://doi.org/10.1080/00411450.2012.672944>.
- 22 **B. Turcksin**, J. C. Ragusa, and W. Bangerth, “Goal-Oriented h-adaptivity for the Multigroup SP_n Equations,” *Nuclear Science and Engineering*, vol. 165, pp. 305–319, 3 Jul. 2010.  DOI: <https://doi.org/10.13182/NSE09-34>.

Conference Proceedings

- 1 S. Das, P. Mota, V. Gavini, **B. Turcksin**, Y. W. Li, and B. Leback, “Fast, scalable and accurate finite-element based *ab initio* calculations using mixed precision computing: 46 PFLOPS simulation of a metallic dislocation system,” in *Proceeding of the international conference for high performance computing, networking, storage and analysis*, Denver, Colorado, Nov. 2019.
- 2 **B. Turcksin**, “Parallel S_n Sweeps on Adapted Meshes,” in *Joint International Conference on Mathematics and Computation, Supercomputing in Nuclear Applications and the Monte Carlo Method*, Nashville, Tennessee, Apr. 2015.
- 3 **B. Turcksin** and J. C. Ragusa, “A Diffusion Synthetic Acceleration Scheme for Rectangular Geometries Based on Bilinear Discontinuous Finite Elements,” in *International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering*, Sun Valley, Idaho, May 2013.
- 4 D. Lebrun-Grandié, J. C. Ragusa, **B. Turcksin**, and P. Solin, “Adaptive Multimesh hp-FEM For a Coupled Neutronics and Nonlinear Heat Conduction Problem,” in *International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering*, Rio de Janeiro, Brazil, May 2011.
- 5 **B. Turcksin**, J. C. Ragusa, and J. E. Morel, “An Angular Multigrid Acceleration Method for S_n Equations with Highly Forward-Peaked Scattering,” in *International Conference on Transport Theory 22*, Portland, Oregon, Sep. 2011.
- 6 **B. Turcksin**, J. C. Ragusa, and J. E. Morel, “Techniques to reduce memory requirements for coupled photon-electron transport,” in *International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering*, Rio de Janeiro, Brazil, May 2011.
- 7 D. Lebrun-Grandié, **B. Turcksin**, and J. C. Ragusa, “Method of Manufactured Solutions for a 2D Neutronics/Heat Conduction Test Case with Adaptive Multimesh hp-FEM,” in *Transactions of the American Nuclear Society, ANS Meeting*, Las Vegas, NV, Nov. 2010.
- 8 **B. Turcksin** and J. C. Ragusa, “Fourier Analysis of new P₁ Synthetic Acceleration for S_n Transport Equations,” in *Pacific Basin Nuclear Conference*, Cancun, Mexico, Oct. 2010.
- 9 **B. Turcksin** and J. C. Ragusa, “Goal-oriented mesh adaptivity for multi-dimension SPN equations,” in *International Conference on Advances in Mathematics, Computational Methods, and Reactor Physics*, Saratoga Springs, New York, May 2009.

- 10 **B. Turcksin** and J. C. Ragusa, “Mesh adaption driven by a posteriori error estimators in an anisotropic framework,” in *Mathematics of Finite Elements and Applications (MAFELAP)*, Brunel University, United Kingdom, Jun. 2009.
- 11 **B. Turcksin** and J. C. Ragusa, “Spatial adaptivity for time-dependent diffusion problems,” in *International Conference on Advances in Mathematics, Computational Methods, and Reactor Physics*, Saratoga Springs, New York, May 2009.

Miscellaneous Experience

Funded Support

- 11/01/2020 - 10/31/2021 ■ **Real-Time IR-data Enhanced Thermal Field Prediction**, SEED Money program from ORNL, PI: \$150,000
- 10/01/2017 - 30/09/2018 ■ **Matrix-Free Algebraic Multigrid Preconditioner**, Laboratory Directed Research and Development from ORNL, PI: \$572,520

Awards

- 2023 ■ **2022 Best Paper Award IEEE Transaction on Parallel and Distributed Systems**, *Kokkos 3: Programming Model Extensions for the Exascale Era*, Christian R. Trott, Damien Lebrun-Grandié, Daniel Arndt, Jan Ciesko, Vinh Dang, Nathan Ellingwood, Rahul Kumar Gayatri, Evan Harvey, Daisy S. Hollman, Dan Ibanez, Nevin Liber, Jonathan Madsen, Jeff Miles, David Poliakoff, Amy Powell, Sivasankaran Rajamanickam, Mikael Simberg, Dan Sunderland, Bruno Turcksin, and Jeremiaj Wilke, IEEE Transactions on Parallel and Distributed Systems, 2022.
- 2019 ■ **Gordon Bell prize finalist**, *Fast, scalable and accurate finite-element based ab initio calculations using mixed precision computing: 46 PFLOPS simulation of a metallic dislocation system*, Sambit Das, Phani Motamarri, Vikram Gavini, Bruno Turcksin, Ying Wai Li, and Brent Leback, SC 19, Proceedings of the International Conference for High Performance Computing, Networking, Storage, Denver, Colorado, November 2019.

Workshops and Conferences

- August 2015 ■ Co-organizer of the *Fifth deal.II users and developers workshop*, College Station, TX.

Supervision of students

- July 2023 - December 2023 ■ Yohann Bosqued, internship for Master’s degree at Central Supelec
- Summer 2023 ■ Tuan Pham, for Sustainable Research Pathways of the Sustainable Horizons Institute
- Summer 2016 ■ Ian Schomer, for the Higher Education Research Experiences at ORNL program