Timothy D. Andersen

Education:

Rensselaer Polytechnic Institute, Troy, NY, (Aug 2003 – Aug 2007)
Ph.D. in Mathematical Sciences, GPA: 3.94

Rensselaer Polytechnic Institute, Troy, NY, Dec 2005
Masters in Applied Mathematics, GPA: 3.94

The University of Texas at Austin (Aug 1999 – May 2002)
B.S. in Computer Science, GPA: 3.5

Awards and Honors

- VIGRE Graduate Fellowship (Fall 2003 - Spring 2005)
- Top Science Writer on medium.com (August 2020): https://medium.com/@andersentda

Dissertation: "Trapped slender vortex filaments in statistical equilibrium", Andersen, T. D., Ph.D. Thesis, Rensselaer Polytechnic Institute, defended May 2007.

Relevant Books:

1. **Andersen, T. D.** and Lim, C. C. *Introduction to Vortex Filaments in Equilibrium*, Springer Monographs in Mathematics Series, Springer-Verlag, New York (2014). https://www.springer.com/us/book/9781493919376.
2. Christopher G. Pernin, Katherine Comanor, Lance Menthe, Louis R. Moore, **Tim Andersen**. Allocation of Forces, Fires, and Effects Using Genetic Algorithms. Technical Reports Series. RAND Corp. Santa Monica, CA. (2008). https://www.rand.org/pubs/technical_reports/TR423.html .

Relevant Papers:

1. Andersen, Timothy D. "Chaotic deterministic quantization in a 5D general relativity." arXiv:2110.05180 [gr-qc] (2021)
2. Andersen, Timothy D. "Quantization of fields by averaging classical evolution equations." *Physical Review D* 99.1 (2019): 016012.
3. **Andersen, T. D.** and Mascagni, M., "Memory Efficient Lagged Fibonacci Random Number Generators for GPU Supercomputing", Monte Carlo Methods and Applications (MCMA), Vol 21, Iss. 2, pp. 163-174. (2015).
4. "A length scale formula for confined Quasi-2D plasmas", Andersen, T. D. and Lim. C. C., *J. Plasma Physics*, vol. 75, no. 4, pp. 437-454, 2009.
5. "Explicit Formulae for nearly parallel vortex filaments in statistical equilibrium", Andersen, T. D. and Lim, C. C. *Geophysical and Astrophysical Fluid Dynamics*, vol. 102, no. 3, Jun. 2008.
6. "Negative Specific Heat in a Quasi-2D Generalized Vorticity Model", Andersen, T. D. and Lim, C. C., *Phys. Rev. Lett.*, vol. 99, no. 165001, Oct. 2007.

7. "Trapped slender vortex filaments in statistical equilibrium", Andersen, T. D. and Lim, C. C., PAMM Volume 6, Issue 1, pages 865-868, December 2006

Relevant Presentations:

1. Invited talk on "Anomalous expansion and negative specific heat in quasi-2D plasmas", AMS Sectional Meeting, Special Session on Vortex Dynamics, NJIT, May 2010.
2. "Exact Solution to the 1d one component Coulomb gas at fixed energy", Joint Math Meetings, Boston, 2012.
3. "Statistical Equilibrium of Slender Vortex Filaments", Joint Math Meetings, New Orleans, 2007.
4. "Anomalous Expansion and Negative Specific Heat in Quasi-2D Plasmas", RPI, Poster Presentation, 2007.
5. "Trapped Vortex filaments as a hard-rod gas", DiPrima Lectures, RPI, April 8, 2006.
6. "Path Integral Monte Carlo Applied to Nearly Parallel Vortex Filaments", RPI, Poster Presentation, 2006.

Grants:

1. Principal Investigator, "High Quality Random Number Generators for High Performance Computing," NASA SBIR Grant Phase I 2012 NNX12CD32P, $125K, 2/12-8/12.
2. Senior Researcher, "Optimal Sensor Scheduling for Ballistic Missile Defense", Missile Defense Agency, SBIR Phase 1 & 2, $600K, 2007-2010.
3. Graduate Student Research Assistant, ARO grant W911NF-05-1-0001 and DOE grant DE-FG02-04ER25616.

Patents:

Interference-Resilient Joint MAC and Routing Design for Wireless Ad hoc Networks, U.S. patent no. 7570593, Elbatt, T. and Andersen, T. D., filed 2004, granted 2009.

Efficient lightweight information dissemination algorithm for mobile wireless Ad Hoc networks, U.S. patent no. 7420954, Elbatt, T. and Andersen, T. D., filed 2003, granted 2008.

Work Experience:

Principal Research Scientist
Georgia Tech Research Institute and Georgia Tech, Atlanta, GA (Oct 2014 – Present)
Head of the Real-time Systems Branch for the Software Engineering and Architectures Division (SEAD) within the Sensors and Electromagnetic Applications Lab (SEAL). Joint academic appointment with the College of Computing. HPC subject matter expert for the SEAL lab. Developed and designed architectures for real-time high performance radar signal processing. Designed real-time architectures for low-latency machine-learning in electronic warfare. Lead

instructor for Design of Operating Systems from Fall 2016 through Fall 2019. Developed GPGPU and MPI cluster-based approaches to real-time signal processing for radar back-ends supporting front-end data rates up to 6 Tbps. Developed high performance signal processing test bed in CUDA and C++ and benchmarks on a dedicated GPU cluster featuring Tesla k20, k40, k80 GPUs and 40 Gb/s Infiniband interlinks. Developed software for real-time radar interferometry in a low-latency, closed loop fire control system run on 4 x 14-core Xeon server, using OpenBLAS to exploit AVX2/FMA3 instructions. Programming Languages: C++, C, MATLAB.

Associate
Daniel H. Wagner Associates, Hampton, VA (Jun 2007 – Oct 2014)
Principal Investigator on Phase I SBIR for NASA Ames Research on Random Number Generation for optimal parallelization on GPUs using CUDA and OpenCL. Software lead for torpedo defense and anti-submarine warfare (ASW) data fusion for integration and deployment on US Navy ships (100,000+ lines of C++ code) and UUVs including fusion of incoming streaming data and automated target classification and image processing. Designed and implemented mathematical algorithms for missile defense sensor scheduling optimization, genetic algorithms for streaming optimization, close object discernment with infrared sensors, and nonlinear regression-based predictor-corrector systems. Applied Bayesian inference to problems in prioritization. Programing languages: MATLAB and C++.

Summer Associate
RAND Corporation, Santa Monica, CA (May 2005 – Aug 2005)
Implemented a genetic algorithm for optimal route finding in a battlespace under uncertainty and investigated the impact on military decision making policy with applications to autonomous vehicles and special forces. Programming language: MATLAB.

Research Software Engineer
HRL Laboratories, Malibu, CA (Feb. 2001 – Aug. 2003)
Implemented satellite networking simulation using MPI on a 50-node Beowulf cluster. Patented research on communication dissemination between vehicles for GM's OnStar program with applications to optimize ad hoc communication between autonomous land vehicles. Optimized throughput for directional antenna systems resulting in a patent. Implemented throughput optimization protocols for multi-layer ad hoc networks. Designed and implemented routing, MAC, and antenna control algorithms for ad hoc wireless networking with applications to aircraft, automobiles, and satellites. Achieved recognition through HRL's bonus program and produced several papers and two patents. Programing Languages: C++, C, Tcl/Tk, Perl.

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