

SALLIE S. "LEE" TOWNSEND

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EDUCATION

University of New Hampshire	Ph.D. in Physics	1977
University of New Hampshire	M.S. in Physics	1970
Smith College	A.B. in Physics	1967

ACADEMIC EXPERIENCE

UNIVERSITY OF HARTFORD

- Assistant Professor of Mathematics* 1997 to Present
Taught undergraduate courses in engineering physics, algebra-based physics, optics, pre-calculus, calculus, and differential equations. Taught a graduate courses in laser optical system design. Developed a scheduling database program in MS Excel to identify instructor and room schedules and conflicts. Developed an Excel program to check student grades in prerequisite courses as well as ensuring they are taking corequisite courses.
- Chair, Audio Engineering Technology* 2001 to 2002
- Associate Dean, Ward College of Technology* 1999 to 2002
Responsible for scheduling of all courses. Developed a scheduling database program in MS Access to identify instructor, room and student curriculum conflicts.
- Director, NASA's Connecticut Space Grant College Consortium* 1999 to 2002
- Adjunct Professor of Mathematics and Physics* 1995 to 1997
Taught undergraduate courses in engineering physics, algebra-based physics, modern physics, pre-calculus, and linear algebra for a total of 12 courses and one laboratory.

UNIVERSITY OF CONNECTICUT

1990, 1991, 1993, 1995

- Adjunct Professor of Electrical Engineering*
Designed and taught graduate courses in Optical Systems Engineering and Quantum Mechanics for Electrical Engineers. Served on advisory committees for several M.S. and Ph.D. candidates.

UNITED TECHNOLOGIES RESEARCH CENTER

1981 to 1993

- Research Engineer*
Member of the UTRC Learning Center Board Of Directors (1992-1993).
Co-founder and coordinator of UTRC Macintosh Users Group (1988-1991).
Co-taught Introduction to Macintosh - UTRC (1988-1989)
UTRC Learning Center instructor:
Introduction to Lasers (1990), and Optical Design (1991).
Co-founder and participant in study group at UTRC in lasers and electro-optics (1988-1992)

SUMMARY of TECHNICAL QUALIFICATIONS

ANALYTICAL

- Simulation and modeling.
- Optics, propagation, lasers, electromagnetics, quantum mechanics, heat transfer
- Linear algebra, eigenmodes, FFT, least squares analysis, rational approximation, orthogonal functions.
- Reduction of theory to an experimentalist's PC tool.

COMPUTER (in order of decreasing expertise)

- Programming Languages: FORTRAN, Visual BASIC for Applications, ActionScript, C, SQL
- Operating Systems: Macintosh, Windows, DOS

INDUSTRIAL EXPERIENCE

IMAGE SOLUTIONS GROUP, LLC

1997 to present

- Member*
Responsible for consulting in the fields of electromagnetics, lasers and optical design. Developed software to predict the performance of electromagnetic waves through a grating. Analyzed a potential new type of laser design for optimal performance. Analyzed a design of laser safety glasses for technical and commercial merit.

ADVANCED OPTICAL EQUIPMENT AND SYSTEMS CORPORATION 1994 to 1997*Vice President and Chief Scientist*

Responsible for theoretical and computational analysis of electromagnetic, thermodynamic, and hydrodynamic phenomena. Shared in the design of the gas flow subsystem and commercialization of the entire system of a mid-power gas dynamic industrial iodine laser. Developed a 1-D closed cycle hydro- and thermodynamic computer code for a refrigerator-like gas flow subsystem design. Co-author of the AOESC Business Plan.

UNITED TECHNOLOGIES CORPORATION

1976 to 1993

RESPONSIBILITIES

Research Engineer

1986 to 1993

Responsible for theoretical and computational analysis of electromagnetic phenomena, primarily in the area of lasers and optics. Developed and produced efficient and experimentally validated software tools for analysis of these systems with emphasis on ease-of-use and reduction of complex analysis to physically intuitive results. Performed as task manager of the theory task of a multimillion dollar government contract.

Sr. Analytical Engineer

1976 to 1986

Updated, maintained and documented UTC's FFT based wave-optics computer codes. Conducted computer modeling for high power laser experiments.

ACCOMPLISHMENTS

- Developed, implemented and validated an algebraic methodology for propagating a non-ideal laser beam's 90% power radius through a complex optical system, thus allowing for rapid design of a wave optics system without the previous requirement of always running large simulation codes to account for diffraction.
- Developed, implemented and validated methods for highly efficient modeling of laser systems and the correspondence of these models with the three-dimensional physical world (details not approved for public release).
- Developed and validated a short series solution for the adaptively-corrected non-linear thermal blooming interaction of high Fresnel number laser beams with the atmosphere, thus eliminating need for 3D computer code analysis.
- Applied a group theoretical analysis to coupled laser systems resulting in eigenmode configuration identification hence minimizing the required number of lengthy computer runs in a test matrix.
- Analyzed the time-dependent thermal properties of laser-irradiated material for hot-spot tracking.
- Developed a short series solution to the determination of low Fresnel number laser modes and propagation.
- Provided theoretical support to an experimental program predicting and measuring the electromagnetic properties of heterogeneous anisotropic ceramic materials. Resulting code was validated by experiment.

PROFESSIONAL ACTIVITIES

- Reviewer for the Optical Society of America. (1988-present).
- Reviewer for the SPIE. (2010).

PATENTS

- 7,492,805 Scalable spherical laser (co-inventor, 2009)
- 5,153,425 Broadband Optical Limiter with Sacrificial Mirror to Prevent Irradiation of a Sensor System by High Intensity Laser Radiation (co-inventor, 1992)
- 5,173,918 High Power Laser Having Staged Laser Adjoint Pulsed Feedback (co-inventor, 1992)
- 5,179,563 Linear Polarization Control of High Power Lasers (co-inventor, 1993)
- 5,802,093 Continuous Wave Photolytic Iodine Laser (co-inventor, 1998)
- 5,889,807 High Power Photolytic Iodine Laser (co-inventor, 1999)

AWARDS

NSF Traineeship 1968-1972
 UTOS Achievement Award 1988

UTOS Outstanding Service Award 1988
 UTRC Great Job Award 1990

ADDITIONAL COURSES*Credit:*

Fluid Mechanics (1979)	C and UNIX (1992)
Programming Languages (1992)	Object Oriented Programming (1992)
X-Window Toolkit (1992)	Interactive Computer Graphics (1992)
Data and File Structures (1993)	Advanced Computer Graphics and CAD (1993)

Audits and Short Courses

Controls Theory (1976 & 1979)
 Random Vibrations and Spectral Analysis (1979)
 Computer Code Vectorization (1980)
 Contemporary Optics (1982)
 Introduction to Chaos and Fractals (1988)
 Advanced Electronic Devices (1990)
 Real-Time Optical Computing (1991)
 Graphical User Interface Development (1992)
 Taguchi Methods for Design of Experiment (1992)
 Small Business Administration (1994)
 Digital Audio Workstation (2002)
 Digital Photography (2005)
 Adobe CS3 Flash (2008)
 Adobe ActionScript 3.0 (2008)

Independent Study

Heat Transfer and Thermodynamics (1994)
 Properties of Gases and Liquids (1995)
 Visual Optics (1997)
 Linear Programming/Simplex (2011)

Lynda.com courses (2010-2011)
 Dreamweaver, CSS, HTML5,
 Flash, SQL, Excel, Premiere,
 Actionscript, Papervision3D,
 Javascript, SketchUp, Objective C

PROFESSIONAL MEMBERSHIPS

Optical Society of America (OSA)
 Society of Photo-Instrumentation Engineers (SPIE)
 American Society for Engineering Education (ASEE)
 Society for Industrial and Applied Mathematics (SIAM)

PUBLICATIONS AND PRESENTATIONS

"Retention-Oriented Curricular Design" Journal of College Teaching & Learning, Volume 7, Number 11, November 2010. (co-author)

"Laser propagation analysis using Plexiglas™ burn samples" Opt. Eng. Vol. 49, 044202 (Apr. 28, 2010) (co-author)

"Approximating Bessel Functions of the First Kind Using Super-Gaussians." Joint Mathematics Meetings, January 5-8, 2009, Washington, D.C (co-author). Presentation only.

"Phase matching considerations in second harmonic generation from tissues: Effects on emission directionality, conversion efficiency and observed morphology". Opt. Comm 281,1823-1832 (2008) (co-author)

"Retention Strategies in Smaller Technology Majors," 2006 ASEE Annual Conference, Chicago, Illinois, June 18-21, 2006 (co-author).

"The Use of the Visual-Spatial Intelligence in the Solution of Elementary Physics Problems," 2003 ASEE Annual Conference, Nashville, TN, June 22-25, 2003 (co-author).

"Teaching Problem Solving in an Integrated Mathematics Writing Curriculum," 2002 ASEE Annual Conference, Montréal, Québec, 16-19 June, 2002 (co-author).

"Word Problems and Problems with Words," presented at the 2001 ASEE Annual Conference, Albuquerque, NM, 24-27 June, 2001 (co-author).

"Recruiting and Retaining Faculty and Managing Diverse Majors in Four Year Schools of Engineering Technology," presented at the 1999 ASEE Annual Conference, Charlotte, NC, 20-23 June, 1999 (co-author).

"Relevance of Physics to the Engineering Technology Education," presented at the 1998 ASEE Annual Conference, Seattle, WA, 28 June-1 July, 1998 (co-author). Presentation only.

"Experimental Implication of Focal Plane Behavior of Top-Hat and Gaussian Beams", presented at SPIE's OE LASE 92, Los Angeles, CA, 19-29 January, 1992 (co-author).

"Scaling Parameters in Thermal Blooming of Ground Based High Energy Lasers", SPIE's OE LASE 91, Los Angeles, CA, 23-24 January, 1991 (co-author).

"Gaussian Scaling Laws for Diffraction", SPIE, Vol. 1415, Modeling and Simulation of Laser Systems II, Los Angeles, CA, 23-24 January, 1991 (co-author).

"Mode Properties and Characteristics of Negative Branch Unstable Ring Resonators", Opt. Eng., 30, 1991, 1553-1562 (co-author).

"Mode Properties and Characteristics of Negative Branch Unstable Resonators", presented at SPIE's OE LASE 90, Optical Resonators, High Energy Lasers, Los Angeles, CA, January, 1990 (co-author).

"Mode Properties and Characteristics of Negative Branch Unstable Resonators", SPIE, Vol. 1224, Optical Resonators, pp. 147-162, 1990 (co-author).

"Coupled Unstable Resonators", (Invited Paper) SPIE, Vol. 1224, Optical Resonators, pp. 202-209, 1990 (co-author).

"Modeling of Supermodes in Coupled Unstable Resonators", SPIE Proceedings, Vol. 643, April 1986.

"Modeling of Supermodes in Coupled Unstable Resonators, SPIE Technical Symposium on Modeling Simulation of Optoelectronic Systems", April 1-2, 1986.

"Multiline Focal Plane Measurement", SPIE Technical Symposium on Synthetic Aperture Optical Systems, April 1-3, 1985.

Multiline Focal Plane Measurement, SPIE Proceedings, Vol. 642, April 1985.

"Performance and Phasing of Multiline Synthetic Apertures", SPIE Proceedings, Vol. 440, August 25-26, 1983 (co-author).

"Performance and Phasing of Multiline Synthetic Apertures", SPIE Technical Symposium on Synthetic Aperture Systems, August 25-26, 1983.

Several internal and government reports.

Dissertation: "Charge Exchange Optical Pumping", 1976