

Curriculum Vitae

Samuel B. French
Composites and Polymer Engineering Laboratory
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EDUCATION

- M.S. Materials Science, 2002
S.D. School of Mines and Technology, Rapid City, SD
Funded by ARL Cooperative Agreement DAAD19-02-2-0011 “*Theoretical and Computational Studies of Thermal Conductivity of Carbon Nanotube Suspensions*”
- B.S. Physics (Math minor), 1999
S.D. School of Mines and Technology

PROFESSIONAL EXPERIENCE

- 2010-Present Research Scientist II, Composites and Polymer Engineering Laboratory, SDSMT
2008-2010 Research Scientist/MEMS Engineer, MEMSense, LLC, Research and Development
2004-2008 Associate Research Scientist/MEMS Engineer, MEMSense, LLC
2003-2004 Staff Scientist, Qualvox, Corp
1998 Manager, KTEQ 91.3 FM, Rapid City, SD

Composites and Polymer Engineering Laboratory (1.5 years)

Member of the Salem Group at SDSMT, Investigations of polymer and composite materials

MEMSense, LLC (5.6 years)

- Investigator on various projects including research (PI, Award NSF-IIP 0741195) in the area of innovative controls for high sensitivity microactuators
- Design of over 100 micro-electromechanical systems (Coriolis angular-rate gyroscopes) with characteristic feature sizes $< 4\mu\text{m}$
- Modeling and control system design (using MATLAB, SIMULINK) for nonlinear dynamic systems (specifically Duffing-type oscillators)
- Design of chip-scale silicon implementations of triaxial gyroscope systems
- Circuit design for optimization of capacitive sensing of small currents ($i < 0.1\text{pA}$)
- Packaging design of MEMS devices with accommodation of CMOS chips and hermetic sealing
- Investigations of vibration mitigation in severe shock acceleration environments for MEMS-based sensor packages, construction of pyrotechnic shock simulator, $a > 10^4\text{g}$
- Modeling of stochastic processes in MEMS inertial sensors with applications to noise compensation algorithms, Kalman filter tuning

Qualvox Corp. (1 year)

- Feasibility of robust, multifunctional, hand-held radiation detection devices
- Test methods for environmental testing of electronics (severe temperature calibration surveys)

Department of Physics

- Computer investigations of behavior of randomly oriented systems of carbon nanotubes near the critical onset of conductivity
- Study of second-order phase transitions in large conductive networks
- Calculation of parameters associated with conductivity, structure, and growth of conductive networks with varying aspect ratio of constituent fibers

Manager of FM Broadcast Station (1 year)

- Responsible for daily operations of a radio station with over 40 employees

DESIGN EXPERIENCE

Experienced professional in electronic sensors and materials manufacturing design with the following highlights (collaborators listed in parentheses):

- Silicon MEMS Vibratory Rate Gyroscopes (MEMSense)
- Silicon MEMS Vibratory Rate-Integrating Gyroscopes (with UC Irvine, Andrei Shkel)
- Non-linear control systems (with Auburn University Dept. of ECE, Robert Dean, Foster Dai)
- High-sensitivity MEMS packaging (with Auburn University Dept. of ECE, Robert Dean)
- Design of nanofiber composites for impact performance (CAPE, ARL)
- Investigation of composite flexoelectric-based piezoelectric materials (CAPE, Baojin Chu)

CODING AND RELATED SKILLS

Current Languages:	C/C++, Python
Commercial FEM/BEM:	Abaqus FEA, COMSOL Multiphysics, Coventorware
Other Computing:	MATLAB (m), FORTRAN, Materials Studio
Other Commercial:	SIMULINK, Labview, OriginPro, Mathematica, Solidworks
Publishing:	Corel Draw, Adobe Photoshop, MS Office
OS:	Linux, Mac, Unix, (Have experience); Windows (Much experience)

TEACHING EXPERIENCE

Teaching Assistant, Dept of Physics, S.D. School of Mines and Technology

- Physics 211, Guest Lecturer
- Physics 213, Guest Lecturer
- Physics 213L, Laboratory Instructor
- Physics 211R, Recitation Instructor

PREVIOUSLY FUNDED RESEARCH

2008, Samuel French, Principal Investigator

Division of Industrial Innovation and Partnerships (IIP-NSF), Award #0741195

“STTR Phase I: Application of an Electrostatic Actuator Stable-range-of-motion Enhancement Control Law to Improve MEMS Gyroscopic Sensors”, Award \$149,865.

2007, Samuel French – Investigator, with James Brunsch (PI) and Robert Dean

Division of Industrial Innovation and Partnerships (IIP-NSF), Award #0712339

“STTR Phase I: High Permittivity Packaging to Enhance MEMS Gyroscopic Sensors”, \$149,974.

PUBLICATIONS

M. Foygel, R. D. Morris, D. Anez, S. French, and V. L. Sobolev, THEORETICAL AND COMPUTATIONAL STUDIES OF CARBON NANOTUBE COMPOSITES AND SUSPENSIONS: ELECTRICAL AND THERMAL CONDUCTIVITY. *Physical Review: B*, **B71**, 104201-1 – 104201-8 (2005).

M. Foygel, R. D. Morris, D. Anez, S. French, and V. Sobolev, MONTE CARLO SIMULATION OF NANOTUBE SUSPENSIONS AND COMPOSITES. *Technical Proceedings of the 2003 Nanotechnology Conference and Trade Show*, vol. 3, pp. 149-151 (February 23-27, 2003, San Francisco, CA, U.S.A)

Thesis: “Monte Carlo Simulations of Nanotubes in Suspension,” under Michael Foygel, PhD, DSc

OTHER EXPERIENCE

Research Assistant, NASA/EPSCoR SD Space Grant Consortium, with Dr. Thomas Campbell, Homestake Mine (DUSEL), Background Study (assembly of background cosmic ray detectors)

HOBBIES AND VOLUNTEERING

Volunteer, Rapid City Regional Hospital, Infusion Services

Actor, Black Hills Community Theatre

Editor, Student Newspaper (The TECH), SDSM&T

Non-faculty Board Member, Tech Educational Radio Council, SDSM&T

Graduate of the Musicians Institute, Prelude Program, Certificate in Bass Guitar Performance

Climber, Mountaineering, Black Hills Needles, Grand Teton, Tetons, Wind River Range, Bighorns WY

Mountain Biking, ‘Dakota 50’, Single Speed Division (gear ratios 32-18, 26” and 32-21, 29”)