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Professional Interests:

- Design of MMIC/RFIC built with III-V or Si- based devices for high-efficiency and low-noise applications, the development of analytical and empirical large-signal and noise equivalent circuit models of high-speed III-V/Si based transistors for RFIC/MMIC design applications, the implementation and development of various measurement techniques to extract parameters for equivalent circuit models.

Education:

- **University of Michigan, Ann Arbor, Michigan**
Ph. D in Electrical Engineering, Jan. 1997- present, expected by Aug. 2002
GPA: 4.0/4.0
- **University of Michigan, Ann Arbor, Michigan**
M.S.E in Electrical Engineering, Dec. 1996
Major/Minor: Solid-state electronics/Circuits/Optics
- **National Tsing-Hua University, Hsinchu, Taiwan**
B.S. in Electrical Engineering, May 1992
GPA: 3.9/4.0 in EE major, 3.5/4.0 overall

Research and Professional Experiences:

- **Research Assistant**, Jan. 1997-present, advisor: Professor Dimitris Pavlidis
 - Expert on semiconductor device characterization and modeling
 - Expert on microwave measurement setup and calibration including load-pull systems and noise systems
 - Extensive experience of microwave circuit design and characterization

Summary of Research and Development Activities:

- **Device Modeling**
 - Large-signal model for high-speed devices: GaAs-based HBTs, InP-based HBTs, SiGe HBTs, GaN-based MODFETs
 - Thermal effects for AlGaAs/GaAs HBTs
 - Nonlinear effects for InAlAs/InGaAs PNP HBTs
 - Dispersion effects for AlGaN/GaN MODFETs
 - Mextram model for SiGe HBTs
 - Low-frequency noise model for InP-based HBTs
 - Low-frequency noise model for AlGaN/GaN MODFETs
 - Microwave noise model for InP/InGaAs HBTs
 - Microwave noise model for AlGaN/GaN MODFETs
- **Established Measurement Systems**
 - Load-pull power characterization
 - Microwave noise characterization
 - Low-frequency noise characterization
 - Pulsed characterization
 - Dispersion characterization
 - Thermal effect characterization
- **MMIC Design**
 - High-speed, wide bandwidth Transimpedance amplifier
 - Microwave Oscillator at ka-band
 - Microwave power amplifier (push-pull and tree configurations) at X-band
 - Microwave mixer
- **RFIC Design**
 - Low phase noise CMOS VCO at 1.9 GHz
 - Low power consumption CMOS OPAM

- **Collaborated Research Labs and Companies**
 - Northrop Grumman (AlGaAs/GaAs HBTs characterization and modeling)
 - IBM (SiGe HBTs characterization and modeling)
 - NTT, TRW (InP-based HBTs characterization and modeling, InP-based microwave circuit design and characterization)
 - HRL (AlGaN/GaN MODFETs characterization and modeling)

Relevant Course Works and Selected Projects:

- Microwave Circuit Design, Analog Circuit Design, Digital Integrated Circuits, Semiconductor Physics, Semiconductor Materials, Microelectronics Process Technology, FET and MMIC Technology, Semiconductor Lasers and LEDs, Principles of Photonics.
- Large-signal modeling of InP-based NPN/PNP HBTs and push-pull amplifier design at X-band (EECS525), low conversion loss microwave balanced mixer design at 4 GHz (EECS411), two-stage high-gain and wide-bandwidth CMOS operational amplifier design (EECS413), and high-frequency voltage-controlled oscillators using CMOS (EECS522).

Computer and Device Modeling Skills:

- Circuit design: ADS, Hspice, SpectreRF, HFSS.
- Device modeling: ICCAP, Medici.
- Device and circuit layout: IC-station.
- Programming language: C, Labview.

Teaching Experiences:

- Electronics Circuits (EECS311): teaching assistant. Winter 98.
- Advanced solid-state microwave circuits (EECS525): Lab and CAD tool (ADS) instructor. Fall 1999, Fall 2000, Fall 2001.

Publications:

▪ **Journals:**

- [1] D. Cui, D. Pavlidis, **S. Hsu**, and A. Eisenbach, “**Comparison of DC, high-frequency performance of zinc-doped and carbon-doped InP/InGaAs HBTs grown by metalorganic chemical vapor deposition,**” *IEEE Trans. Electron Devices*, vol. 49, no. 5, pp. 725-732, May, 2002.
- [2] D. Cui, D. Pavlidis, **S. Hsu**, D. Sawdai, P. Chin, and T. Block, “**First demonstration of monolithic InP-based HBT amplifier with PNP active load,**” *IEEE Electron Device Letters*, vol. 23, no. 3, pp. 114-117, Mar. 2002.
- [3] D. Cui, **S. Hsu** and D. Pavlidis, “**Ka-band oscillators using InP-based HBTs,**” *Journal of Solid-State Electronics*, vol. 46, no. 2, pp. 249-253, Feb. 2002.
- [4] D. Cui, **S. Hsu**, and D. Pavlidis, “**DC and High Frequency Characterization of Metalorganic Chemical Vapor Deposition (MOCVD) Grown InP/InGaAs PNP Heterojunction Bipolar Transistor,**” *Jpn. Journal of. Appl. Phys.* Vol. 41, no. 2B, pp. 1143-1149, Feb, 2002.
- [5] D. Sawdai, K. Yang, **S. Hsu**, D. Pavlidis, and G. Haddad, “**Power performance of InP-Based single- and double-heterojunction bipolar transistors,**” *IEEE Trans. Microwave Theory Tech.*, vol. 47, pp. 1449-1456, Aug. 1999.
- [6] **S. Hsu**, B. Bayraktaroglu, and D. Pavlidis, “**Comparison of Conventional and Thermally-Stable Cascode (TSC) AlGaAs/GaAs HBTs for Microwave Power Applications,**” *Journal of Solid-State Electronics*, vol. 43, no. 8, pp. 1429-1436, 1999.
- [7] **S. Hsu**, D. Pavlidis, J. S. Moon, M. Micovic, and D. Grider, “**Low-frequency Noise Characteristics of Submicrometer AlGaN/GaN MODFETs,**” to be published.
- [8] **S. Hsu** and D. Pavlidis, “**A comparison of low-frequency noise characteristics and noise origins in InP-based NPN and PNP Heterojunction bipolar transistors,**” to be published
- [9] **S. Hsu**, D. Pavlidis, and D. Sawdai, “**Low-Frequency Noise Characteristics of PNP InAlAs/InGaAs HBTs,**” to be published.
- [10] **S. Hsu**, D. Pavlidis, M. Ida, and T. Enoki, “**Microwave noise characteristics and equivalent circuit parameters for low-noise, high-speed InP/InGaAs HBTs,**” to be published.
- [11] D. Cui, **S. Hsu**, and D. Pavlidis, “**InP-Based Complementary HBT Push-Pull Amplifiers,**” to be published.

[12] D. Cui, **S. Hsu**, and D. Pavlidis, “**Design and Fabrication of X-Band Coplanar “Tree” HBT Amplifiers,**” to be published.

▪ **Conferences:**

- [1] **S. Hsu**, P. Valizadeh, D. Pavlidis, J. S. Moon, M. Micovic, D. Wong and T. Hussainand, “**Impacts of RF stress on Dispersion Effects and Power Characteristics for AlGaIn/GaN HEMTs,**” accepted by 24th *IEEE GaAs IC Symposium*, 2002.
- [2] **S. Hsu**, D. Pavlidis, J. S. Moon, M. Micovic, D. Wong and T. Hussainand, “**Gate and Drain Low-frequency Noise Models of AlGaIn/GaN MODFETs,**” accepted by *IEEE Lester Eastman conference*, 2002.
- [3] **S. Hsu**, P. Valizadeh, D. Pavlidis, J. S. Moon, M. Micovic, D. Wong and T. Hussainand, “**Study on Large-signal Linearity and Efficiency of AlGaIn/GaN MODFETs,**” accepted by 31st *European microwave conference*, 2002.
- [4] **S. Hsu**, D. Pavlidis, J. S. Moon, M. Micovic, D. Wong and T. Hussainand, “**Gate- and Drain- Noise Characteristics of AlGaIn/GaN HEMTs and Study of their Origins,**” proceeding of 26th Workshop on Compound Semiconductor Devices and Integrated Circuits in Europe (WOCS-DICE) 2002.
- [5] D. Cui, D. Pavlidis, **S. Hsu**, D. Sawdai, P. Chin and T. Block, “**InP-based complementary HBT push-pull MMICs,**” proceeding of proceeding of 26th Workshop on Compound Semiconductor Devices and Integrated Circuits in Europe (WOCS-DICE) 2002.
- [6] **S. Hsu**, D. Pavlidis, J. Moon, M. Micovic, C. Nguyen, and D. Grider, “**Low noise AlGaIn/GaN MODFETs with high breakdown and power characteristics,**” 23rd *IEEE GaAs IC Symposium*, pp. 229-232, 2001.
- [7] **S. Hsu**, D. Pavlidis, M. Ida, and T. Enoki, “**Low noise, high-speed InP/InGaAs HBTs,**” 23rd *IEEE GaAs IC Symposium* , pp. 188-191, 2001.
- [8] **S. Hsu**, D. Pavlidis, J.S. Moon, M. Micovic, C. Nguyen, D. Grider, “**High frequency noise studies in AlGaIn/GaN MODFETs,**” WOCS-DICE 2001, Cagliari, Italy, May 25-30, 2001.
- [9] D. Cui, **S. Hsu** and D. Pavlidis, “**First InP/InGaAs PNP HBT grown by metal organic chemical vapor deposition**”, 13th *IEEE Int. Conf. Indium Phosphide and Related materials*, to be presented May 14-18, Nara, Japan, pp. 224-227, 2001.
- [10] E. Alekseev, **S. Hsu** and D. Pavlidis, “**Broadband AlGaIn/GaN HEMT MMIC attenuators with high dynamic range,**” Proceeding of 30th *European microwave conference*, 2000.
- [11] D. Cui, D. Sawdai, **S. Hsu**, D. Pavlidis, P. Chin and T. Block, “**Low DC power, high gain-bandwidth product, coplanar Darlington feedback amplifiers using InAlAs/InGaAs heterojunction bipolar transistors**”, 22nd *IEEE GaAs IC Symposium*, pp.259-262, 2000.
- [12] D. Cui, D. Sawdai, D. Pavlidis, **S. Hsu**, P. Chin and T. Block, “**High power performance using InAlAs/InGaAs single HBTs,**” 12th *IEEE Int. Conf. Indium Phosphide and Related Materials*, pp. 473-476, 2000.
- [13] D. Buttari, A. Chini, G. Meneghesso, E. Zanoni, D. Sawdai, D. Pavlidis, and **S. Hsu**, “**Hole impact ionization coefficient in (100)-oriented In_{0.53}Ga_{0.47}As,**” 12th *IEEE Indium Phosphide and Related Materials (IPRM’00)*, Williamsburg, VA, May 15-19, pp. 258-261, 2000.
- [14] **S. Hsu**, P.N. Tan, D. Pavlidis, E. Alekseev, N.X. Nguyen, C. Nguyen, and D.E. Grider, “**Frequency dependent output resistance and transconductance in AlGaIn/GaN MODFETs,**” Proceeding of 1999 *International Semiconductor Device Research Symposium (ISDRS)*, Charlottesville, Virginia, pp. 315-317, Dec., 1999.
- [15] **S. Hsu**, D. Sawdai, and D. Pavlidis, “**Modeling of highly-Nonlinear HBT Characteristics using a distributed thermal subcircuit Derived from Pulsed Measurements,**” 53rd *ARFTG conference (MTT Symposium) Digest*, Anaheim, California, Jun. 17-18, pp.139-145, 1999.
- [16] **S. Hsu**, B. Bayraktaroglu and D. Pavlidis, “**Comparison of conventional and thermally-stable cascode (TSC) AlGaAs/GaAs HBTs for microwave power applications,**” *Topical Workshop on Heterostructure Microelectronics for Information Systems Applications*, Kanagawa, Japan, Aug. 30-Sep. 2, pp. S3-6, 1998

References

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