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Dr. Alexander S. Rukhlenko

CURRICULUM VITAE OF ALEXANDER S. RUKHLENKO, Ph. D.

SPECIALIZATION AND INTERESTS

Bulk/Surface Acoustic Wave (BAW/SAW) Devices, Film Bulk Acoustic Resonators (FBAR), SAW/BAW filters, duplexers, etc.

CAD/CAE design and simulation of BAW/SAW devices (models, algorithms, software development and programming)

Technical applications development (MATLAB, C/C++, Fortran)

Measurement automation, testing and characterization of BAW/SAW devices

Acquisition, processing and visualization of the simulation and/or measurement data

PROFILE

A problem-solver and researcher by nature and inclinations, adept at fostering interdisciplinary approaches to problem solutions using MATLAB and computer-aided design (CAD) tools.

Focused experience in the CAD software development for industrial companies. Accomplished at MATLAB for computing and engineering, an author of the proprietary MATLAB toolbox for SAW filter design acquired by industrial SAW companies and universities.

Proficient in high-level language programming (C/C++, Fortran) for technical applications including user-defined MATLAB C/C++ or Fortran MEX functions and PathWave Advanced Design System (ADS) user-compiled models (UCM). Familiar with ADS Application Extension Language (AEL).

Creator of the unique C/C++ interface to integrate MATLAB models into ADS circuit simulator that allows to improve simulation accuracy, flexibility and computational speed in designing BAW or SAW devices.

Skilled in SAW/BAW micro-modeling (including but not limited to COM, RAM, quasi-static approximation, Mason's model, BVD, etc.) and macro-modeling (cascading SAW components at the system level to model SAW devices such as bidirectional and low-loss unidirectional SAW filters, ladder-type SAW filters, one- and two-port SAW resonators, DMS, CRF, etc.).

Competent in computer-aided design, modeling and simulation of BAW/SAW devices. Experienced in designing state-of-the-art IF SAW filters for high-volume production. Hands-on experience in measurement automation, data acquisition and processing for device characterization.

Experienced in SAW filter optimization techniques to meet the customer specifications, improve SAW filter performance, reduce design time and effort.

Solid background in RF and microwave engineering, electrodynamics, physical acoustics, piezoelectricity and ultrasonics.

Proven teaching, lecture/presentation, and technical writing skills.

TESTIMONIALS

"… Alexander is a high-caliber expert in the computer-aided design of SAW devices. He possesses a wide-ranging interdisciplinary background and he works hard to advance his professional capabilities.…I am confident that his excellent professional capabilities and strong personality will make him a distinguished university lecturer/teacher or researcher."

Dr. John Vig, IEEE Fellow, Past-President of the IEEE, Past-President of the UFFC, USA

"…Dr. Rukhlenko has theoretical and experimental experience of almost all of the wide variety of SAW devices. He has extensive computer programming experience in this connection. I am confident that he would be a valuable member of an organization concerned with this or related areas".

Dr. David P. Morgan, Impulse Consulting, UK

"Dr. Alexander Rukhlenko worked for me as consultant on the design of SAW filters at Toko America. He was able to create a useful SAW filter meeting the customer's requirements. He used his own software in preparation of this design.
…Dr. Rukhlenko's experience can benefit any company's effort in the area of SAW design."

Dr. Donald R. Allen, Director of Engineering, CTS Wireless Components, USA

EDUCATION

- Belarusian State University, Dept. of Radiophysics and Electronics, specialization *"RF and Microwave Engineering*" (Master's Degree *with distinction*), 1973-1978
- Post-graduate study (Doctorate), Minsk Radio Engineering Institute, 1980-1983
- Ph.D. Thesis "Computer-Aided Design of Surface Acoustic Wave (SAW) Devices for Signal Processing", Belarusian State University, Minsk**,** Belarus, 1989

PROFESSIONAL EXPERIENCE

AVAGO/BROADCOM GmbH, Modeling & Characterization Dept., Munich, Germany, Senior Staff Engineer: 2008-2022

Elaborated and implemented a unique ADS circuit simulator interface with MATLAB based on undocumented ADS and MATLAB features. Implemented ADS FBAR Process Design Kit (PDK) with MATLAB UCM components. Developed various ADS UCM components programmed in MATLAB (frequency-dependent SMD components for matching circuits, FBAR models, models of SAW interdigital transducers and resonators).

Developed software for dispersion calculation and acoustic modes analysis in the multilayered FBAR structures. Optimized multilayered structures to improve piezoelectric coupling and thermostability (TC-FBAR).

Developed fast matrix techniques for implementation of the Mason's model in MATLAB. Implemented numerically stable and fast algorithms of searching resonance frequencies in ADS and MATLAB for arbitrary multilayer resonator structures.

Modeled and simulated Film Bulk Acoustic Resonators (FBAR) and filters, CRF (Coupled Resonator Filters) and DBAR (Double Bulk Acoustic Resonator) structures with ADS and MATLAB.

Provided an important link between modeling/characterization and designer groups.

INFINEON TECHNOLOGIES, Munich, Germany, Senior Staff Member: 2006 – 2007

Responsible for computer-aided design, modeling and simulation of Solidly Mounted Resonators (SMR) and SMR filters.

Developed MATLAB software for multilayer SMR stack simulation (dispersion diagram calculation, stress and strain distribution, acoustic modes visualization).

TEMEX TIME, Neuchâtel, Switzerland, Contractor: 2005

Developed models and adaptive algorithms for compensation of temperature and aging effects in high-precision smart-timing GPS quartz oscillators.

INSTITUTE OF MICROTECHNOLOGY, Sensors, Actuators and Microsystems Lab, Neuchâtel, Switzerland, Consultant (Part-time): 2004

Design and simulation of Micro-Opto-Electro-Mechanical Systems (MOEMS). Developed MOEMS macromodels for CoventorWare electro-mechanical simulation.

THORONICS GmbH, Bevaix, Switzerland, Consultant, 2003-2004

Developed software for SAW modeling and simulation, computer-aided design of bidirectional and unidirectional (low-loss) SAW filters, prototype development and characterization.

TEMEX SAW, Neuchâtel, Switzerland, Principal Engineer: 2001-2002

Developed company computer-aided design software (MATLAB, C/C++) for SAW filter design.

Designed state-of-the-art SAW filters and resonators for mass production.

Designed, tested and characterized new prototype devices (bidirectional SAW filters, Single-Phase Unidirectional Transducers (SPUDT), slanted-finger SPUDT, SAW resonator filters).

LG, Seoul, SAWNICS, Cheonan-Si, South Korea, Principal Designer: 1997-2000

Developed company computer-aided design software (MATLAB, C/C++) for bidirectional and uni-directional (low-loss) SPUDT SAW filters.

Designed and tested state-of-the-art SAW filters for high-volume production.

Trained and instructed LG and SAWNICS engineers in designing SAW filters.

SAWTEK INC., USA, Consultant: 1995-1996

As the winner of the SAW Filter Design Competition (arranged and sponsored by SAWTEK in the former USSR countries) contributed in the software development at the company.

Upgraded the company SAW filter design techniques to improve simulation accuracy and speed.

Designed prototype devices using proprietary design techniques to reduce the development time and device size and costs.

MINSK RADIO ENGINEERING INSTITUTE, Acoustoelectronics Lab, BELARUSIAN STATE UNIVERSITY, Semiconductor Physics and Nanoelectronics Dept, Minsk, Belarus, Researcher - Senior Researcher - Principal Researcher: 1978-1994

Participated at numerous national SAW research projects sponsored by industry (IC factory “Integral”, TV factory “Horizon” and others).

CAD/CAM/CAE, PROGRAMMING

- PathWave Advanced Design System – ADS (KeySight)
- ADS Application Extension Language (AEL)
- MATLAB, Microsoft Visual Studio C/C++, Digital Visual Fortran
- MATLAB Toolboxes for RF Circuit Design, Signal Processing, Digital Signal Processing, Filter Design, Linear- and Non-Linear Programming and Optimization

LANGUAGE EXPERIENCE

- Russian – native language
- English – spoken and written, regular and long practice
- French – operational level ("niveau opérationnel de base")
- German – intermediate level (B2), good technical comprehension and reading