

SAW Modelling Techniques

Victor Plessky (GVR Trade SA)

This course provides introduction to the design techniques of SAW devices. The course includes:

- a) SAW transducer. SAW excitation on piezoelectrics by linear charges. Elementary theory of the Interdigital Transducer (IDT) with non-reflecting electrodes. Design of typical IDTs on quartz and LiNb. Delay lines design and characteristics. Matching issues.
- b) SAW reflectors. Propagation of SAW in periodic structures. Coupling of modes (COM) model. Simulation with COM model of IDTs and reflectors.
- c) SAW resonator design; Synchronous resonators. Extraction of COM parameters.
- d) STW resonators
- e) Single Phase Unidirectional Transducer (SPUDT)- design and applications.
- f) CRF/DMS filter design – examples of device simulation; optimization software
- g) Ladder filters design.
- h) Design of SAW-tags and sensors
- i) Modeling of SAW devices based on Green's function software

During the lecture the attendee will see demonstration of design process for typical filter specifications. The COM model will be presented in details sufficient for practical use. The course will conclude with review of unsolved problems and challenges in SAW devices design area.

Victor P. Plessky was born in Gomel, Belarus (ex-USSR) on July 02, 1952. From year 1991 he lives and works in Switzerland. Before leaving the USSR he worked as a head of laboratory in IRE of Russian Academy of Sciences in Moscow region. He have got his Ph.D. degree from the Moscow Institute of Physics and Technology (“Fiztech”) in 1978, Doctor of Science degree in physics and mathematics from my Institute of Radio-engineering and Electronics (IRE RAS, 1987), and the Full Professor title from Russian Government, 1995. Last 17 years he works in Switzerland, first as a Principal Scientist in a small company Micronas SA, in Neuchâtel area. Now he is an owner and CEO of consulting company GVR Trade SA. His main sphere of interests is theory of microacoustics, surface acoustic waves (SAW) theory and devices, devices for signal filtering and frequency control, SAW sensors and SAW-tags. A few his works, such as discovery of the *surface transverse waves (STW)*, or “*Plessky Equation*” for “leaky SAW” in periodic structures have got wide recognition. His monograph “*Surface acoustic waves in inhomogeneous media*” originally published in Russian, was translated and edited by Springer, in Germany. Dr. V. Plessky worked as Visiting Professor in HUT (Finland), Freiburg University (Germany), Uppsala University (Sweden), EPFL (Switzerland). He has authored or co-authored over 200 papers and many patents. For many years he serves ad TPC member of the IEEE Ultrasonics Symposium.