

BAW and FBAR Lectures

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This page contains links to Bulk Acoustic Wave (BAW) and Film Bulk Acoustic Wave Resonator (FBAR) lectures by Dr. Alexander Rukhlenko. This collection of advanced lectures covers the theory, design, modeling, and simulation of BAW and FBAR devices. In particular, the lectures discuss theoretical foundations of acoustic waves in solids, multilayer wave propagation, dispersion diagram analysis, and practical simulation techniques and algorithms used with [MATLAB®](#) and [Keysight® PathWave Advanced Design System \(ADS\)](#).

Furthermore, the lecture series covers Mason equivalent circuit models, FBAR impedance analysis, multilayer transfer-matrix methods, and boundary conditions for mechanical and electrical interfaces. In addition, it addresses dispersion diagram evaluation used in modern acoustic wave device design and analysis. Overall, the lectures demonstrate analytical and numerical methods for modeling piezoelectric multilayer structures and acoustic resonators. Moreover, practical simulation examples illustrate modeling procedures, algorithms, resonance analysis, and interpretation of computational results.

Learning Objectives and Target Audience

The lectures provide a progressive learning path. They begin with fundamental wave physics and then move toward computational modeling, MATLAB software development, and device-level simulations. They are intended for engineers, researchers, and graduate students working in RF filters, BAW and FBAR devices, piezoelectric materials, microwave electronics, and wireless communication systems.

Each lecture includes a detailed abstract and lecture outline, as well as theoretical background, mathematical derivations, and practical simulation examples. In addition, most lecture materials are accompanied by live computer demonstrations based on MATLAB software developed by the author.

Lecture Index and Navigation

This page is structured as a reference index for quick navigation to individual lecture contents.

Click one of the links below to read the corresponding abstract and lecture outline:

1. [*Mason Equivalent Circuit Model: Theory and Applications*](#)
2. [*FBAR Modeling and Simulation Using the Mason Model*](#)
3. [*Layer Stack Analysis: Wave Propagation and Dispersion Diagram*](#)

Web version: [*BAW and FBAR Lectures of Dr. Alexander Rukhlenko*](#)