

COMSOL for Modelling of STW Devices

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Introduction: Electroacoustic resonators employing surface acoustic waves (SAW) are commercially widely used in RF filters, low noise generators as well as various sensors. Here we present a specific COMSOL based approach towards the design of a specific class of SAW resonators, namely surface transverse wave resonators (STWR).

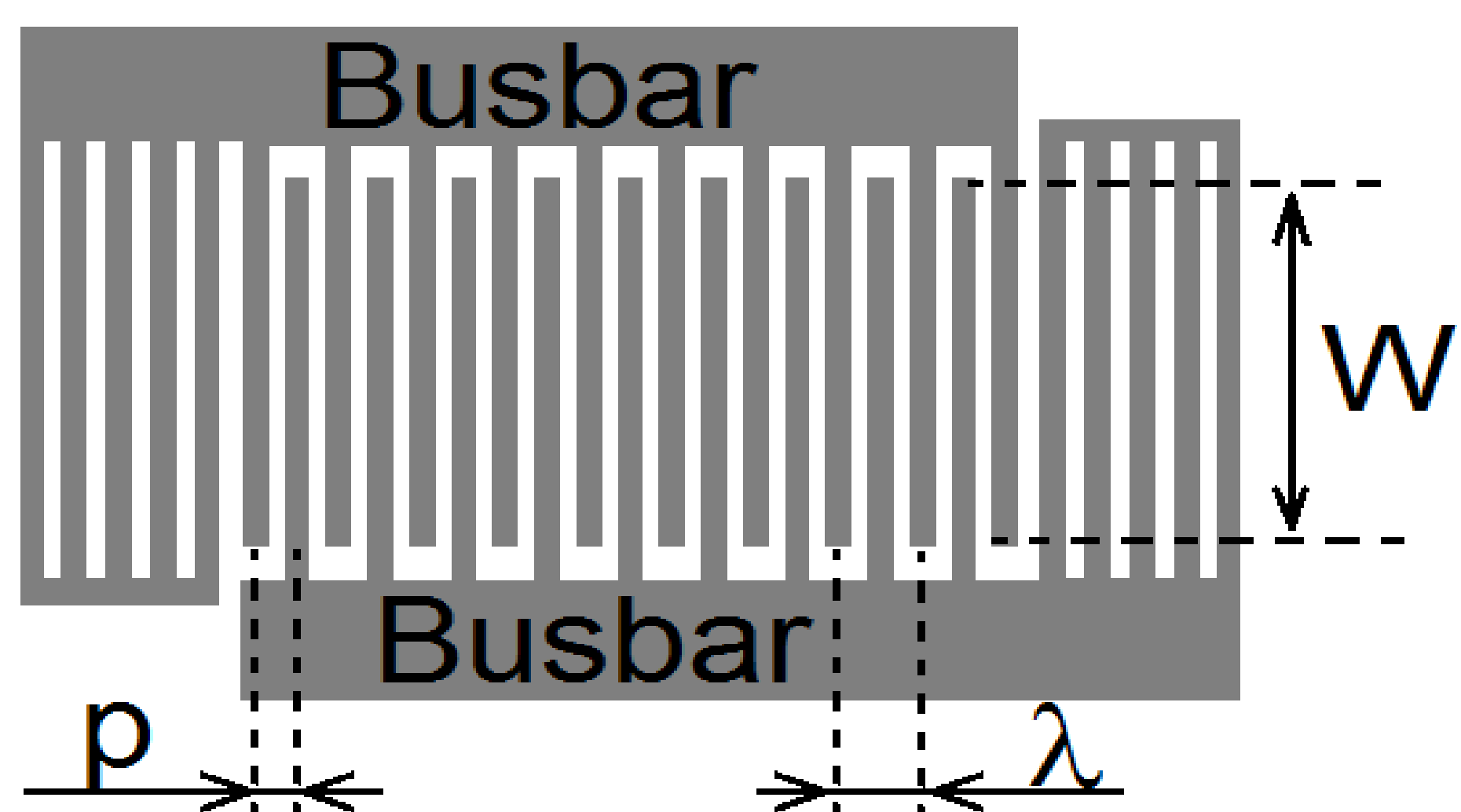


Figure 1. Sketch of a state of art SAW (STW) resonator

Computational Methods:

COMSOL – Structural Mechanics -
Piezoelectric Devices

Problems Solved:

- Eigenfrequency and Frequency Response analyses of a single wavelength cell.
- 2D Frequency Response analysis of finite STW Resonator
- Frequency Response analysis of STW 3D primitive cell, including busbar area

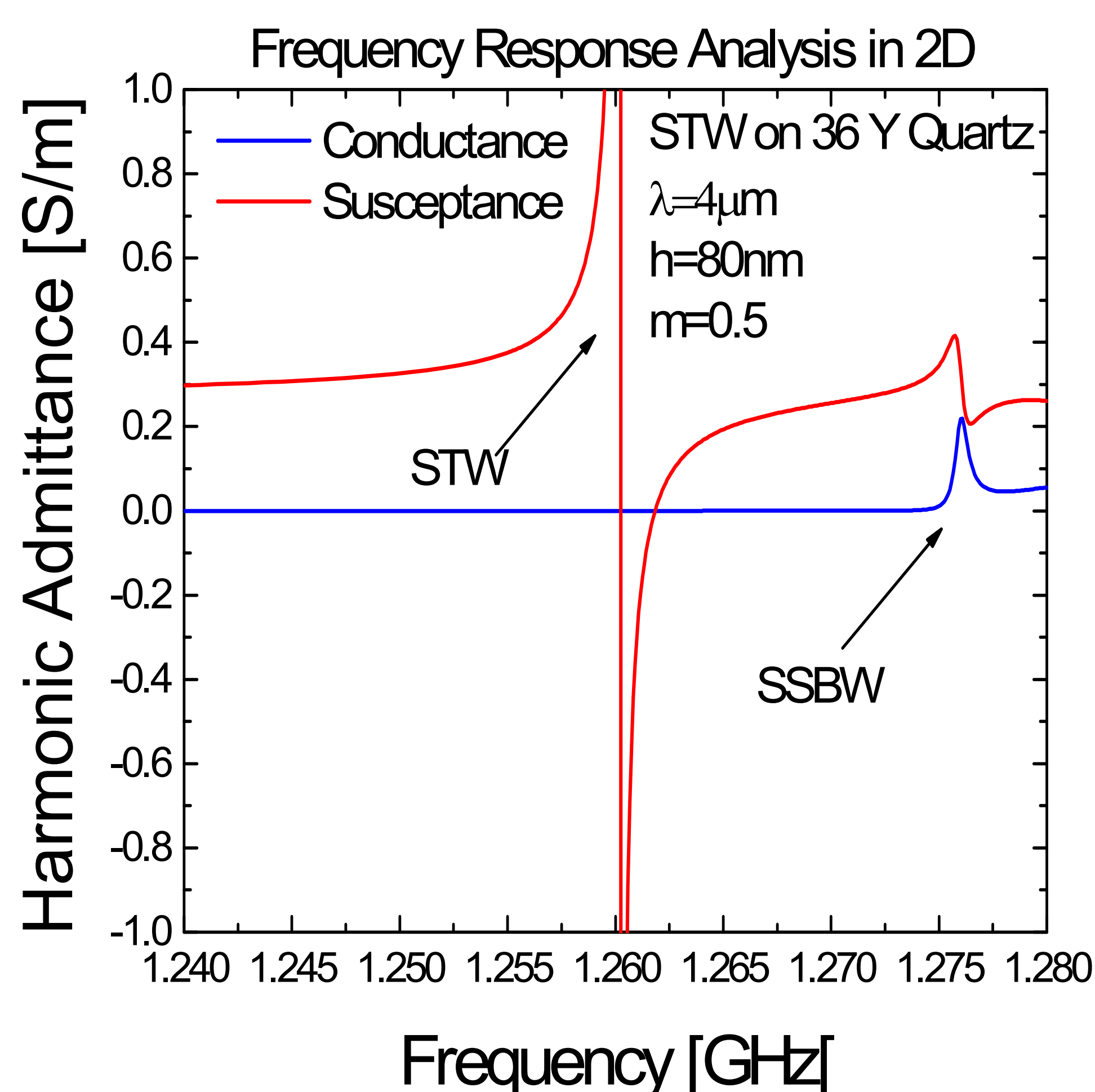
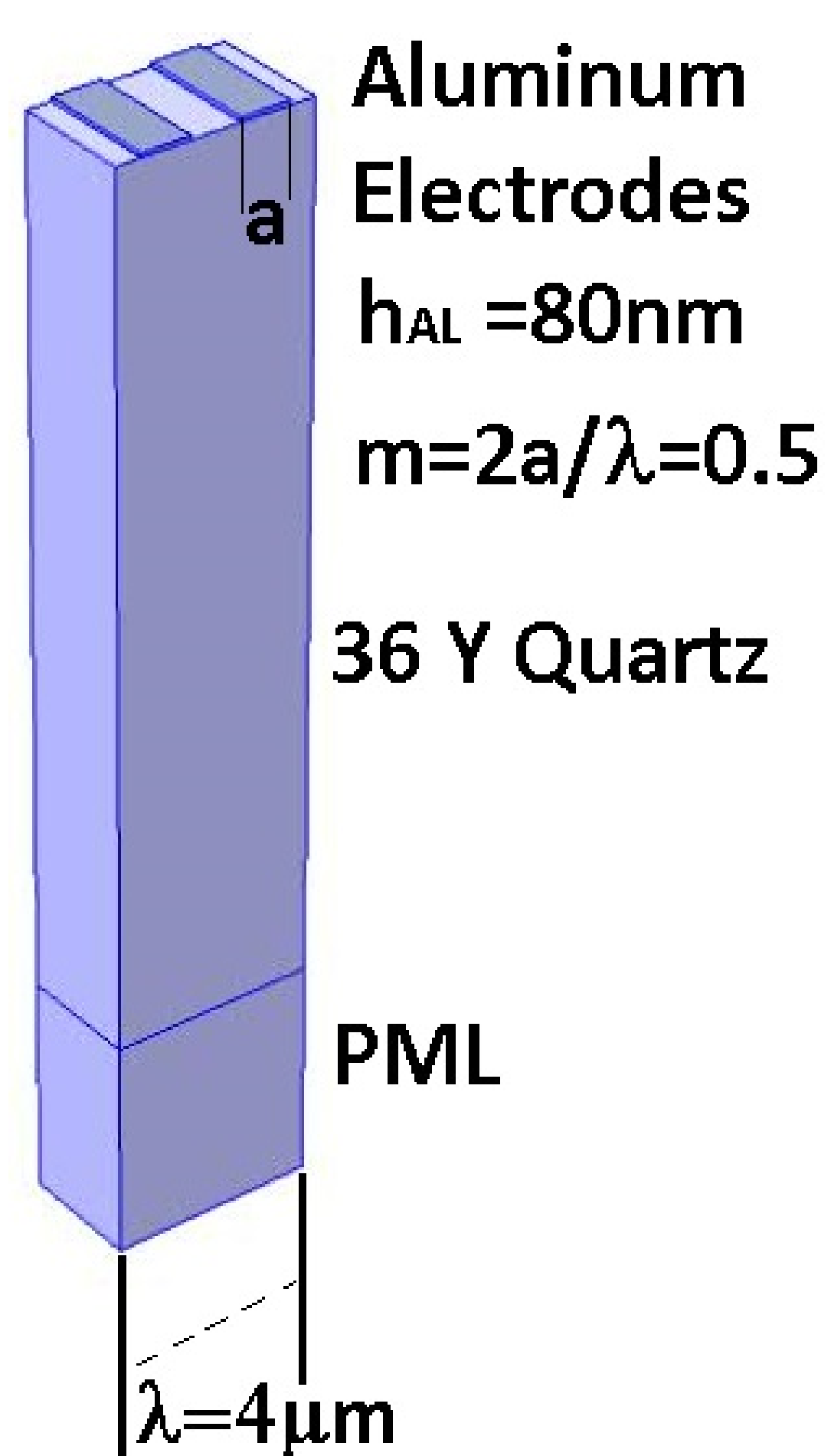


Figure 2. a) Primitive Cell b) Harmonic Admittance

Results: Two modes : STW and SSBW:

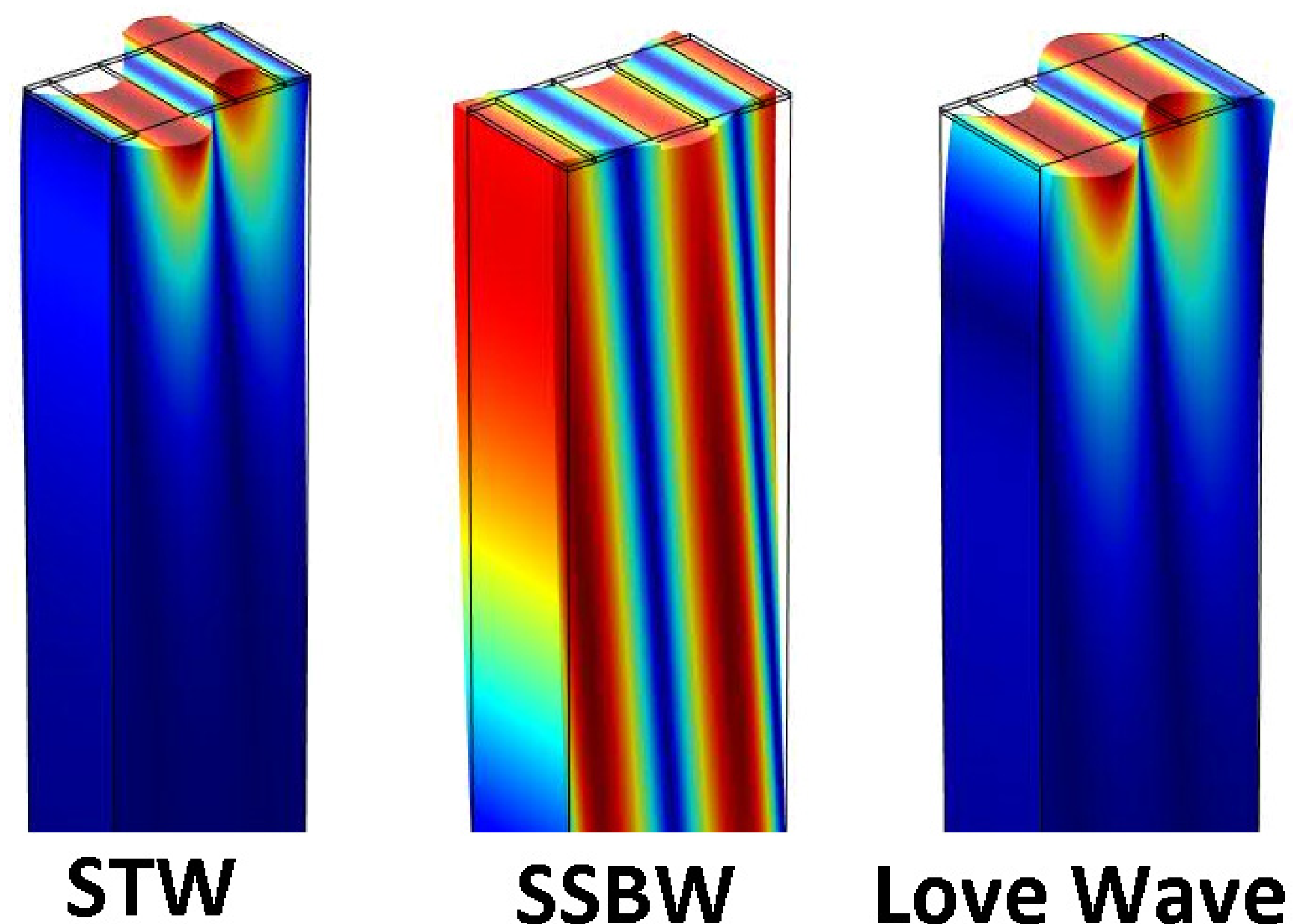


Figure 3. Modes in the STWR: STW and SSBW under IDT and Reflectors and Love Wave under Busbars

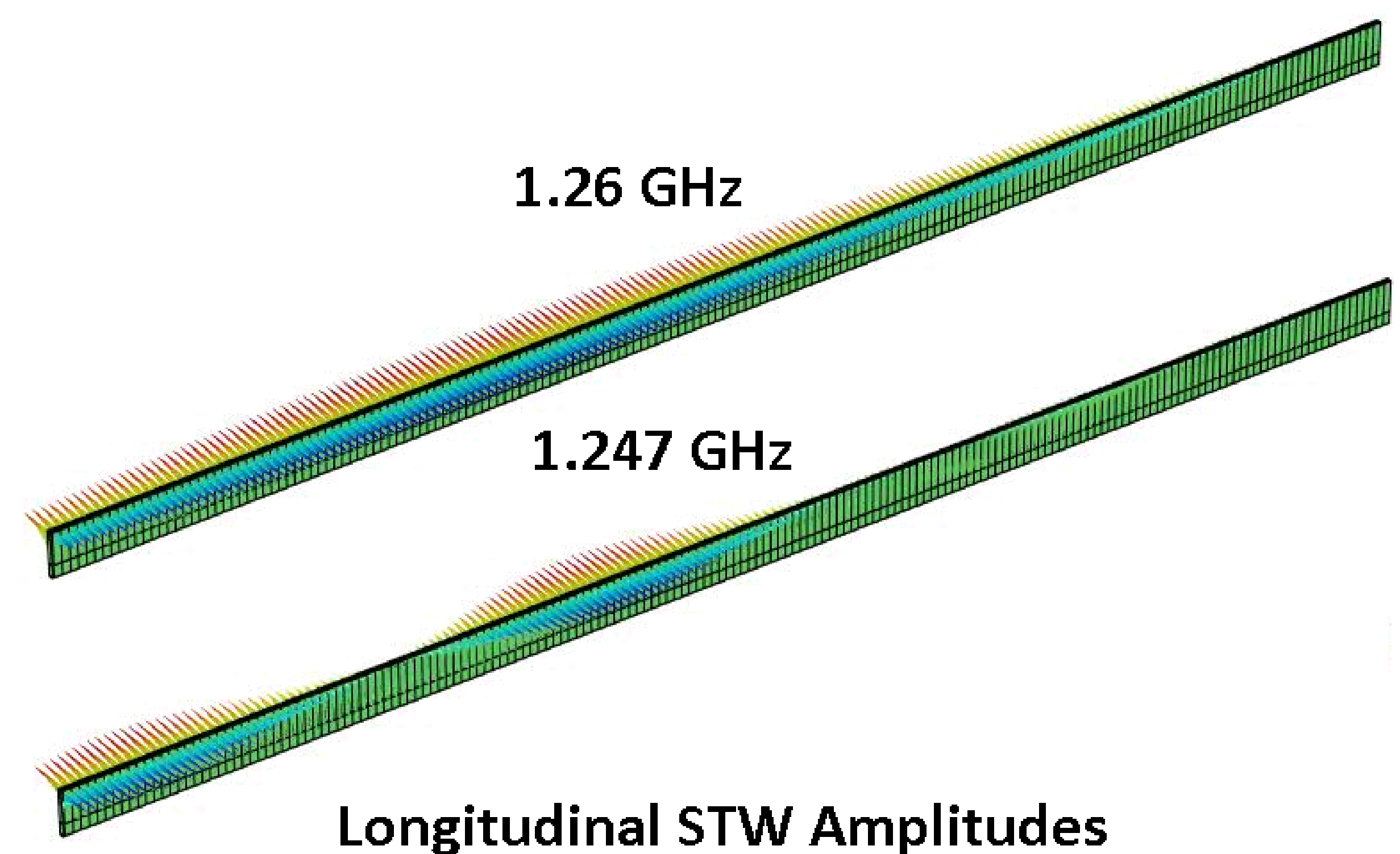


Figure 4. Longitudinal Amplitudes in STWR

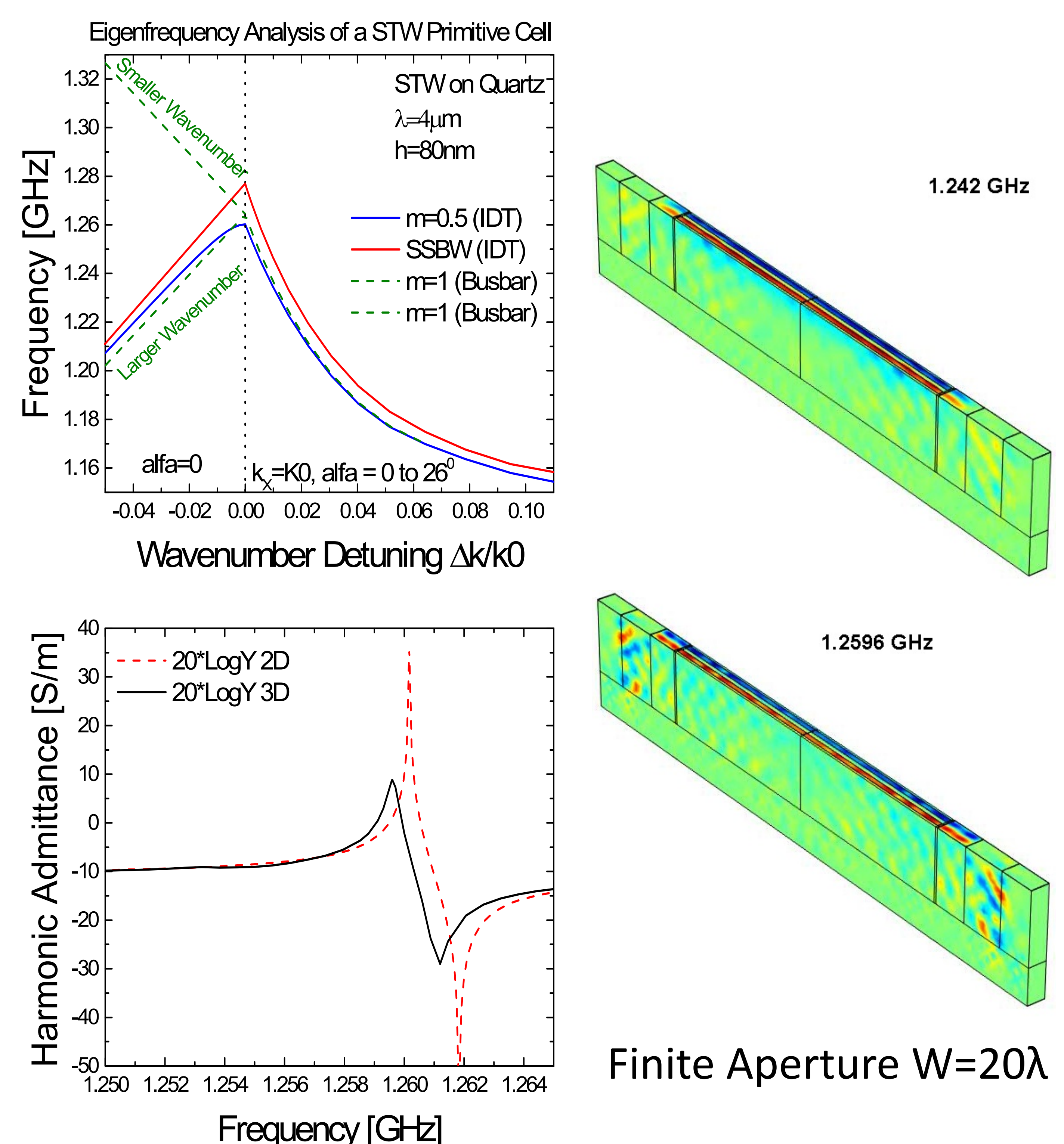


Figure 5. Influence of Busbars in Finite Aperture STWR