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RF uWave Lab

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Post-Lab Report #5

**Summary:** The purpose of this lab introduce students to harmonic tuning stubs, whose purpose is to filter out unwanted harmonics from an incoming signal while allowing the fundamental frequency to pass virtually unimpeded. This was done by using ADS tuning function and Momentum to perform EM simulations with computer generated board layouts. The circuit being tested in the lab is a two terminal transmission system with a tuning stub located between the two terminals.

**Discussion:** Figure 1 is the schematic with which all standard simulations are performed. Referencing Figure 2, the circuit simulation adheres closer to the design frequency than the Momentum simulation because of the latter simulates more like a physical circuit than the ideal ADS simulation design. The discrepancy between to the is shown via this equation:

If Meas1 = 5GHz, and Meas2 = 4.82GHz, this equation solves to:

To reduce this discrepancy, and tune the Momentum circuit layout to adhere more closely to the design frequency, one should shorten the stub length. This is because a 5GHz signal has a shorter wavelength than a 4.82GHz signal. Due to realistic imperfections in a practical (or momentum simulation), the generated layout maximizes a lower frequency than desired. By shortening the stub length, we compensate for the imperfections and bring the layout back to the desired 5GHz filter. Finding the percent bandwidth of the circuit simulation, we use a similar equation to the one for percent discrepancy:

Referencing data shown in Figure 3, this equation solves to:

**Gallery:**

A close up of text on a white background

Description automatically generated

Figure : Simulation Schematic

A close up of a map

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Figure : Circuit Sim (left) and Momentum Sim (right)

A close up of a mans face

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Figure : Circuit Simulation

A sky view looking up at night

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Figure : Momentum Sim Layout

A close up of text on a white background

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Figure : Momentum Sim Schematic

A close up of a map

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Figure : Momentum Sim Circuit Results