

Bachelor/Master Thesis:

Explorative Study of metamaterial-based resonating structures for high frequency RF building blocks

In RF electronics resonating structures play an important role, for example for oscillators or filters. Usually, these resonators are built from inductors and capacitors, where the former provide only very poor tuning capabilities. However, so-called metamaterials can be used to manufacture specialized structures with arbitrary electro-magnetical properties such as negative refractive index and potentially tunable resonance frequency.

In this work the use of metamaterial-based resonators for oscillators and filters will be examined. The target frequency of the applications is in the range of 60 GHz.

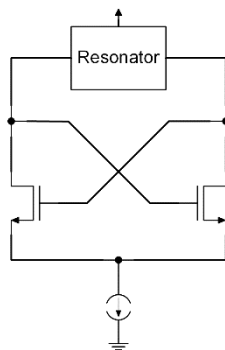


Fig. 1: Resonator-based Oscillator

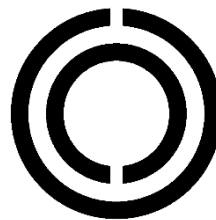


Fig. 2: Split-Ring Resonator

Goals:

- 1) Familiarize yourself with the theoretical foundations of oscillators, resonators and electro-magnetic structures
- 2) Build and simulate the resonator in Cadence Virtuoso and/or Keysight ADS
- 3) Check tunability and compare to conventional designs

Stretch Goals:

- 1) Built a simple oscillator based on the resonator

Prerequisites:

Basic knowledge of analog design, electromagnetic theory and Cadence Virtuoso. Keysight ADS is a plus.

Contact: patrick.schulz.1@tu-berlin.de