



Nuhertz Filter Design With Parameterized Sonnet Geometry

For Speed and Accuracy

Nature of the Problem

- EM Design Accuracy is by nature slow and time consuming
 - Numerous EM simulations required
 - EM simulation accuracy requires massive number crunching
- Quantum computers not yet available 😞

Best Solution to the Problem

- Be Smart About EM Computational Efficiency
 - Sonnet is an industry leader in minimizing EM computational requirements
- Be Smart About Minimizing Need for EM Computations
 - Synthesis as accurately as possible before EM optimization
 - Optimize with minimal number of EM simulation runs

Filter Design with EM Optimization

- Parameterized Geometry
 - Small set of independent parameters to optimize
 - Each vertex assigned as a dependency to one or more independent parameters as needed
 - Full project integrity maintained as independent parameters are adjusted.
- Sonnet 17 Provides for All of the Above

Simple Interdigital Example

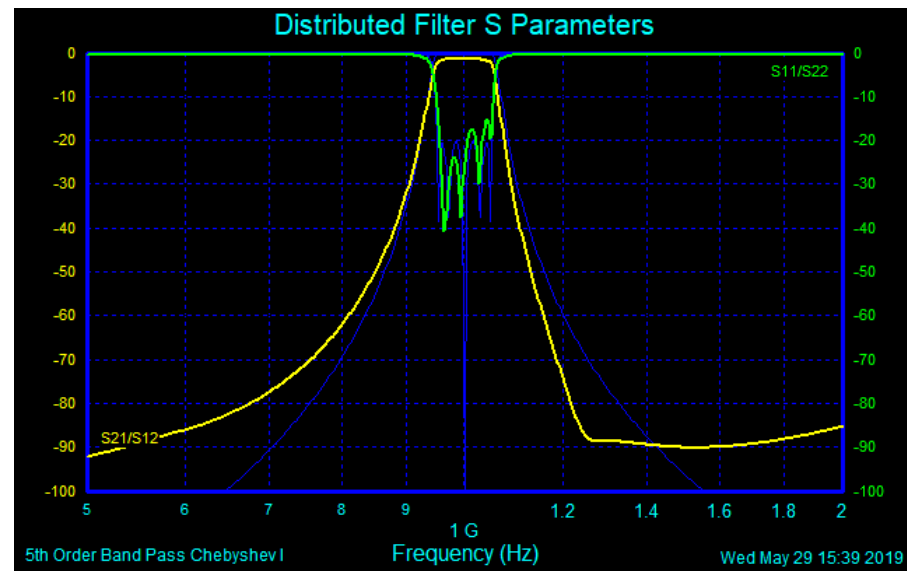
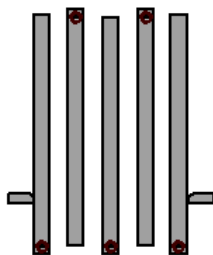
FilterSolutions Synthesis

- Synthesis and Circuits Optimization are Simple and Routine
- Nonadjacent resonator coupling leads to difficulties in EM response

5th Order Band Pass Chebyshev I
Center Frequency = 1.000 GHz
Pass Band Width = 100.0 MHz
Pass Band Return Loss = 20 dB

Microstrip Filter
Er = 9.800 (Alumina)
Dielectric Height = 50 mil
Cover Height = 250 mil
Conductor Thickness = 0.1 mil

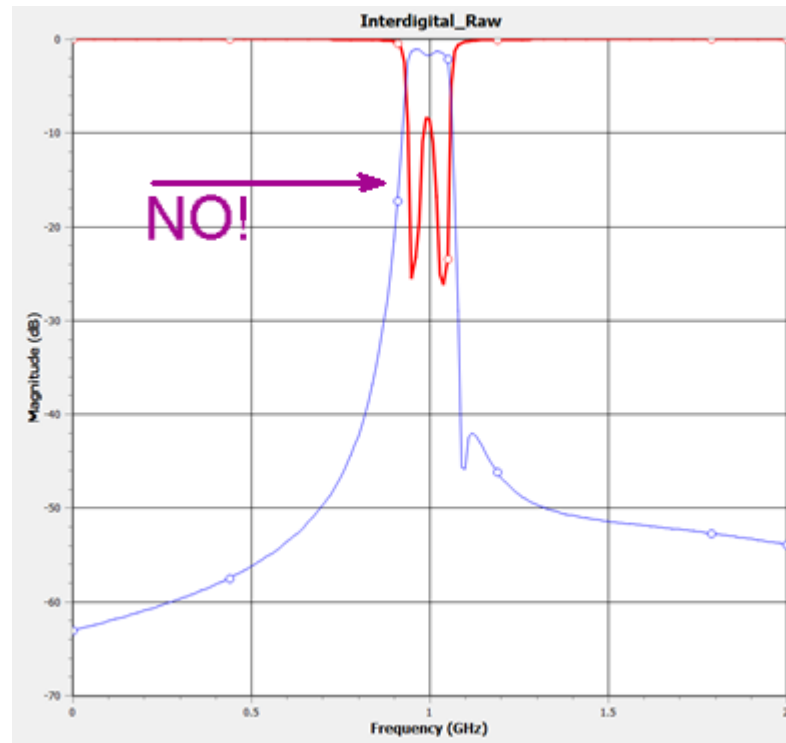
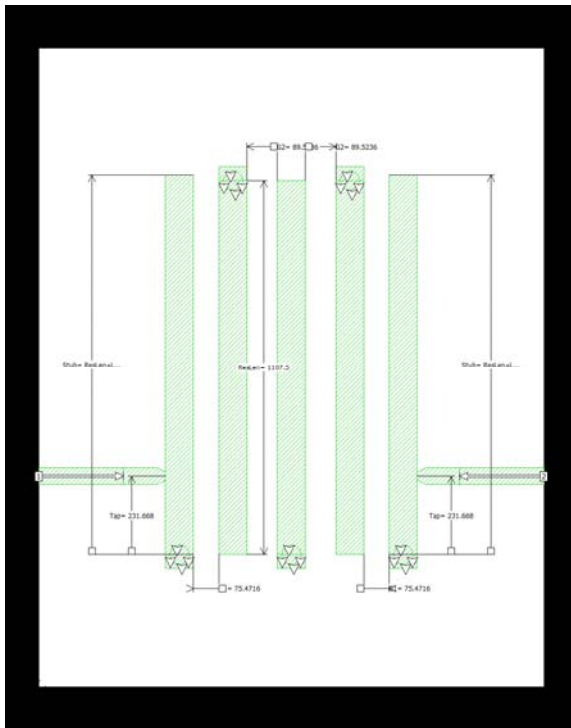
884.1 mil
Total Width: 991.7 mil
Total Height: 1190 mil



Simple Interdigital Example

Sonnet EM Simulation

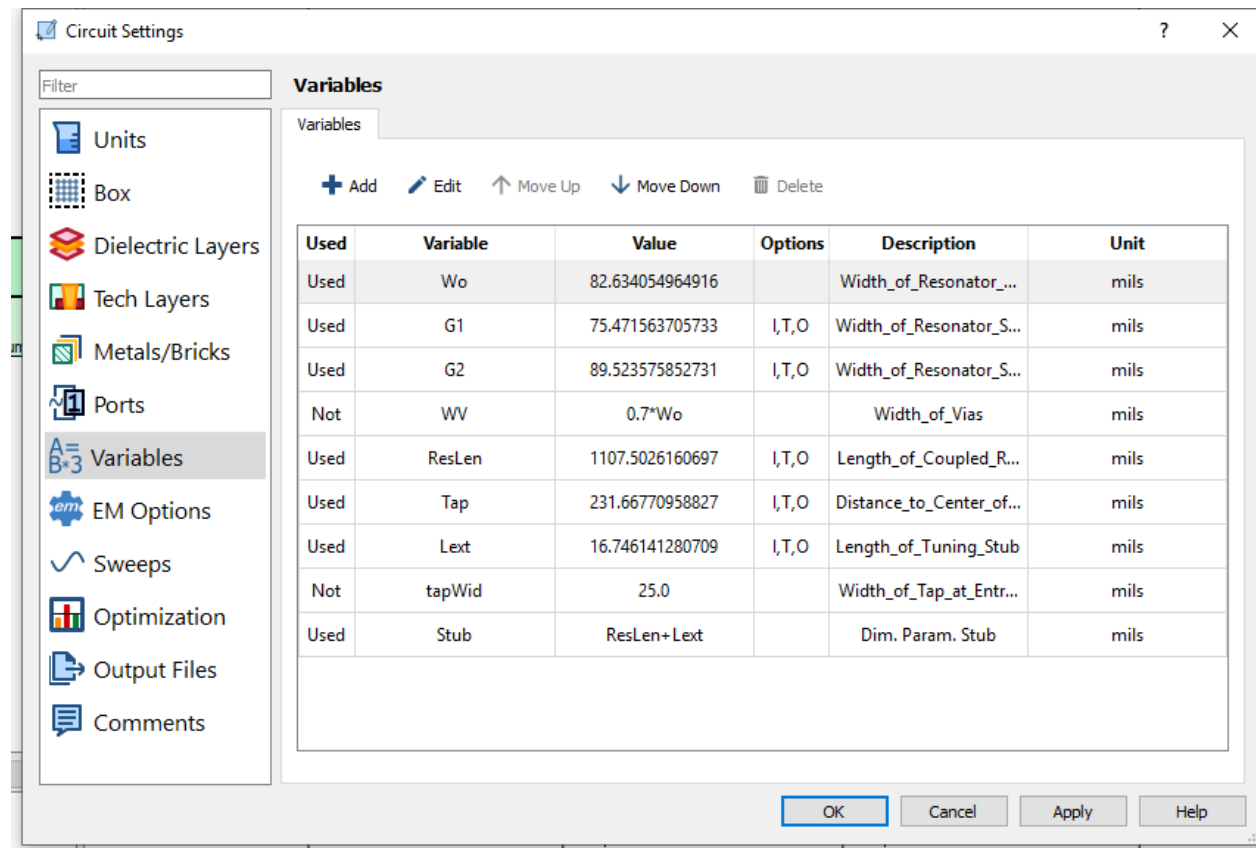
- Sonnet EM simulation shows undesirable resonator coupling effects



Sonnet Interdigital Example

Independent Design Parameters

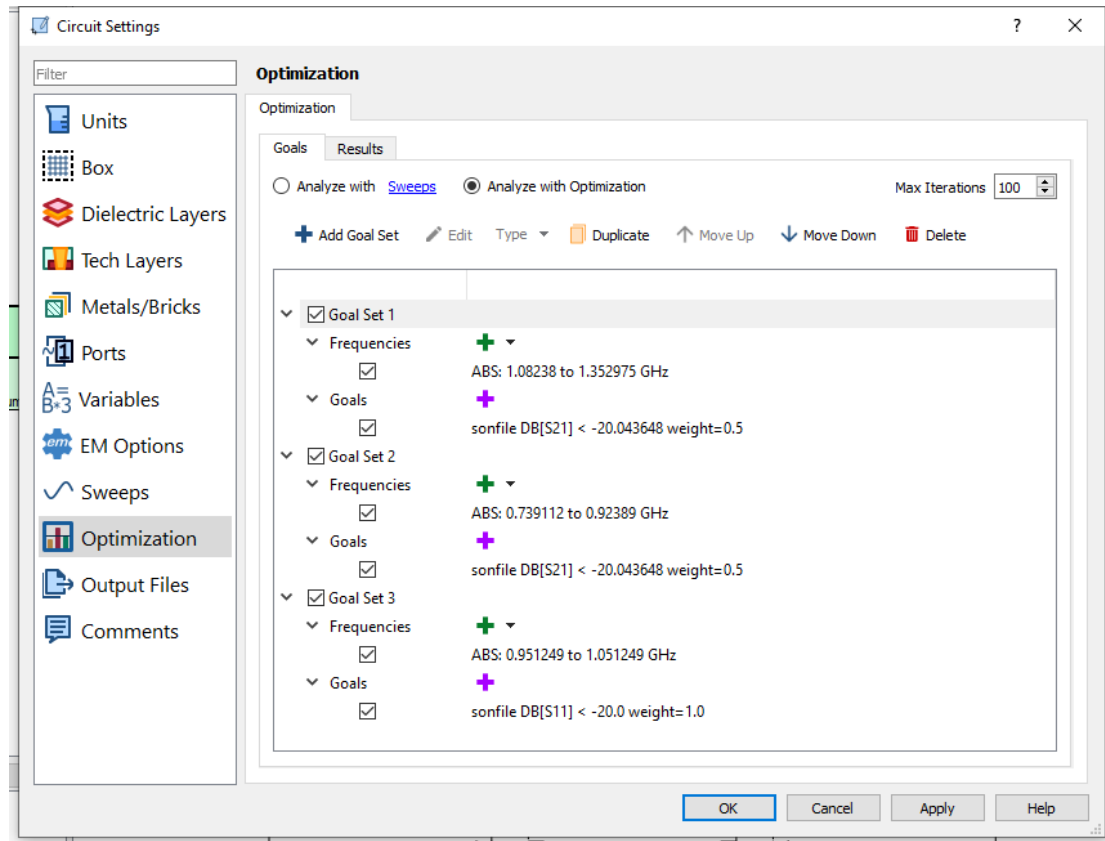
- Independent design parameters exported directly into Sonnet project



Simple Interdigital Example

Sonnet Optimization Solution

- Optimization Goals Exported Directly Into Sonnet EM Project
- Sonnet executes project optimization to achieve desired goals as close as possible



Simple Interdigital Example

Execute Simulation

- Parameter variables are automatically adjusted as needed
- Accurately optimizes the S12 and S11 of the graph

