

ECE 6130 -- Microstripline Filter Implementation

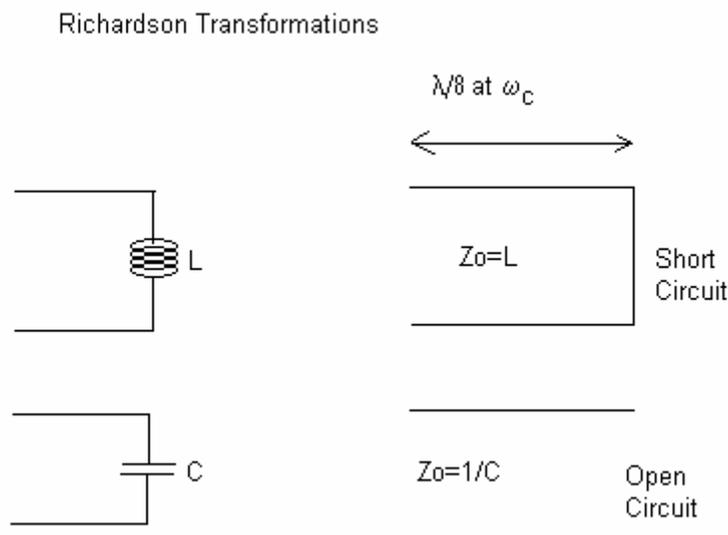
Portfolio Question:

How do you implement a filter design using stubs? Include information on applying the Richardson Transformation and Kuroda identities.

Richardson Transformations:

Filter designs are developed as "ladders" of inductors and capacitors. These can be implemented in microstripline as open or short circuited stubs.

The equivalent circuits are:



To verify these, see Smith Chart examples.

Use this to implement a filter:

Example:

Design a LP filter for fabrication using microstriplines. The specs are: cutoff frequency of 2 GHz, attenuation of at least 30 dB at 4 GHz, impedance of 50 ohms, 3 dB equal-ripple characteristic.

Step 1: Find the order of the filter.

See Figure 8.27b. $|\omega/\omega_c| - 1 = |4 \text{ GHz} / 2 \text{ GHz}| - 1 = 1.0$ The attenuation of 30 dB requires a fourth order filter $N=4$.

Step 2: Find the filter coefficients and draw the LC filter.

See Table 8.4b for 3dB equal-ripple.

Step 3: Convert to stub network. This would work, but for microstrip configuration, we need all parallel stubs. Series stubs can't be built in microstrip.

Kuroda Identities:

Used to convert for buildability. Convert to parallel stubs.

See notes.