Home assignment in microwave engineering

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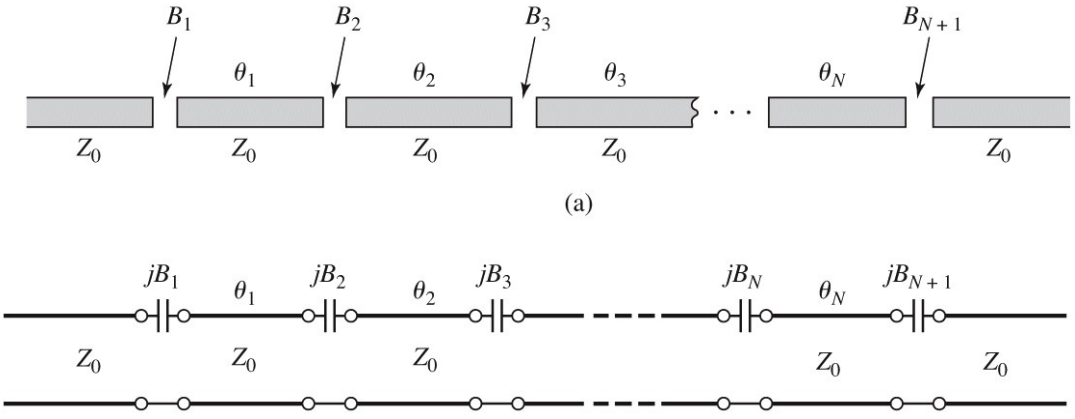
Problem course week 6

Consider an infinite long filter based on capacitively coupled series resonators. It will act as a bandpass filter when each section is approximately λ/2. The line impedance is 50 ohm, electrical length is 160° at 2 GHz, and the gap capacitance is ca 0.5pF. Derive and plot the *k*-β relationship (Brillouin diagram) assuming the filter consists of infinite number of unit cells in cascade (periodic). Discuss and compare with the 3-section example 8.9 in Pozar, which is based on a different synthesis approach. Hint! For a reciprocal network (*AD-BC=1*), the propagation constant for a wave on an infinite long periodic structure can be derived from:

$cosh(\gamma d) = \frac{A+D}{2}$, where *A* and *D* are *ABCD*-parameters of the unit cell.



(1p)

Good Luck! / JS

Home assignment in microwave Engineering: ferrite components

Derive the the S-parameters matrix for this 4 port (P1, P2, P3, P4 on the figure below) device using ferrites: