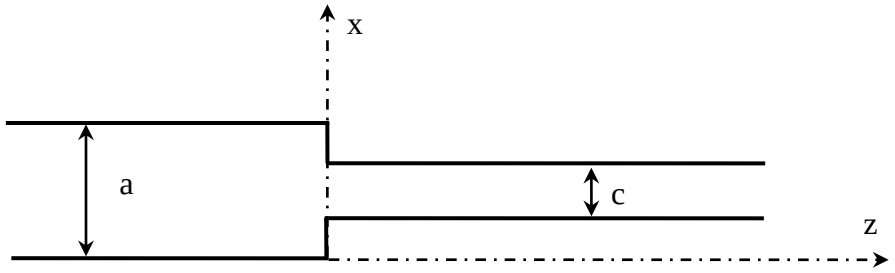
Microwave Theory EMM780 2021

Assignment#2 (submission date: 10 May 2021)

Symmetrical H-plane step: The wider waveguide has a width "a" and the narrower waveguide has a width "c". Assume that the junction is excited from the direction of the wider waveguide with a dominant TE_{10} mode propagating in the +z-direction.



a) Write a program in Matlab to analyze the junction.

b) Assume a = 22.86 mm, b = 10.16 mm – compute the magnitude of the reflection coefficient of the dominant mode over the band 8 – 12 GHz if c = 18.0 mm. Plot on a graph. Do the problem using 1 mode and 5 modes.

c) Assume a = 22.86 mm, b = 10.16 mm – compute the magnitude of the reflection coefficient of the dominant mode as function of "c" at f = 10 GHz. Plot on a graph. Do the problem using 1 mode and 5 modes.

d) Compare results with CST studio simulations

Assignment#3 (submission date: 24 May 2021)

Design a 4-section impedance matching network with a Chebyshev response to match a 35Ω line to a 75Ω load. The maximum permissible SWR over the passband is 1.5. The centre frequency is 4 GHz. Implement the structure in microstripline with $\varepsilon_r = 2.2$ and h = 1.58 mm. Draw the matching network and indicate all physical dimensions. Analyze the matching network (calculate the reflection coefficient as function of frequency) using equation 2.67 in Pozar (write a Matlab program). Determine the bandwidth.

Assignment#4 (submission date: 7 June 2021)

Design a quadrature branch-line coupler with at least 30% bandwidth (VSWR < 1.5) at a centre frequency of 2.0 GHz. You may consider using multiple sections of branch-line coupler (search the open literature for a design procedure). Implement in microstrip line on a substrate of your choice. Simulate in CST and show results.