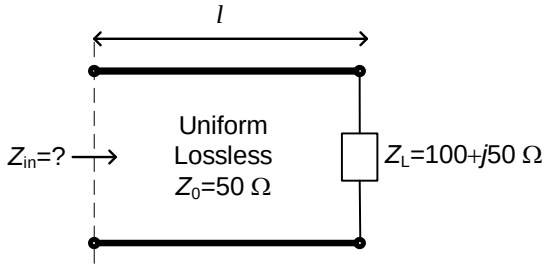
University of Portland
School of Engineering

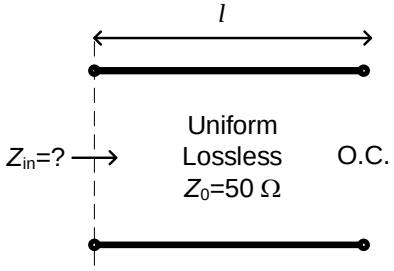
EE 301
Spring 2018
A. Inan

Homework # 5
(Assigned: Friday, March 9, 2018)
(Due: Friday, March 23, 2018, 11:25a.m.)

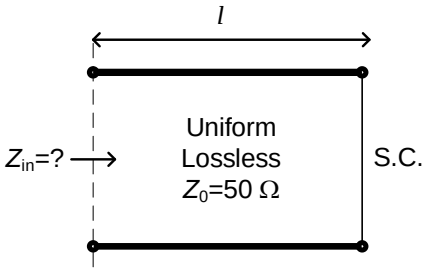
Inan problem # 3: Input Impedance of a Transmission Line Circuit.
For the uniform lossless 50 **Ω** transmission line circuit shown, find the input impedance Z_{in} of this transmission line for the following line lengths: (a) $l = 0.125\lambda$; (b) $l = 0.25\lambda$; (c) $l = 0.375\lambda$; (d) $l = 0.5\lambda$; and (e) $l = 1.25\lambda$.



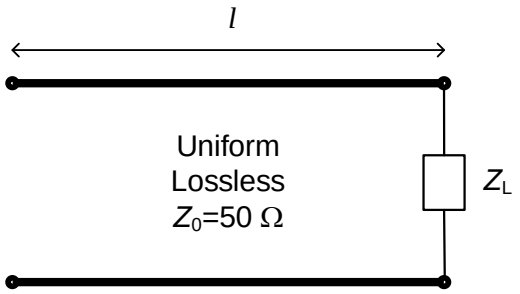
Inan problem # 4: Input Impedance of a Transmission Line Circuit.
A uniform lossless 50 **Ω** transmission line is terminated with an open-circuit termination as shown. Find the input impedance Z_{in} of this transmission line for the following line lengths: (a) $l = 0.125\lambda$; (b) $l = 0.25\lambda$; (c) $l = 0.375\lambda$; (d) $l = 0.5\lambda$; and (e) $l = 1.25\lambda$.



Inan problem # 5: Input Impedance of a Transmission Line Circuit.
A uniform lossless 50 **Ω** transmission line is terminated with a short-circuit termination as shown. Find the input impedance Z_{in} for the following line lengths: (a) $l = 0.125\lambda$; (b) $l = 0.25\lambda$; (c) $l = 0.375\lambda$; (d) $l = 0.5\lambda$; and (e) $l = 1.25\lambda$.

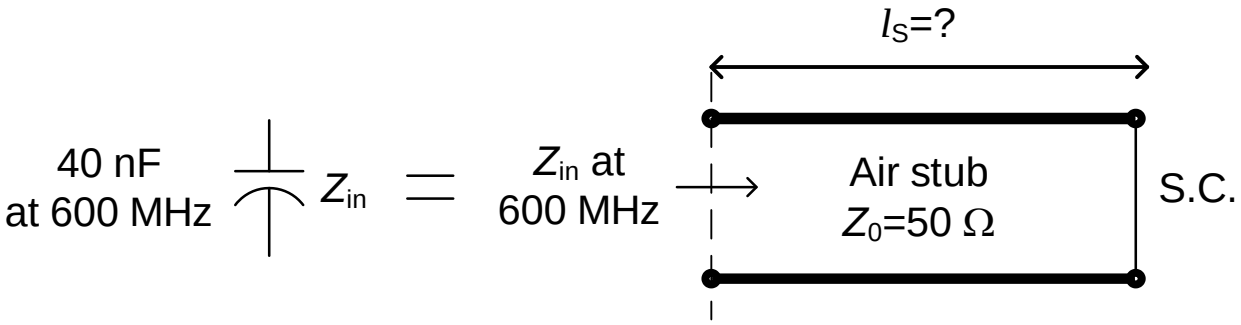


Inan problem # 6: Load Reflection Coefficient and Standing Wave Ratio.
For the 50 Ω transmission line shown, find the load reflection coefficient Γ_L and standing-wave ratio S for each of the following load impedances: (a) $Z_L = 50\,\Omega$; (b) $Z_L = 250\,\Omega$; (c) $Z_L = 25\,\Omega$; (d) $Z_L = \infty\,\Omega$; (e) $Z_L = 0$; (f) $Z_L = j100\,\Omega$; (g) $Z_L = 100 + j100\,\Omega$; and (h) $Z_L = 50 - j100\,\Omega$.

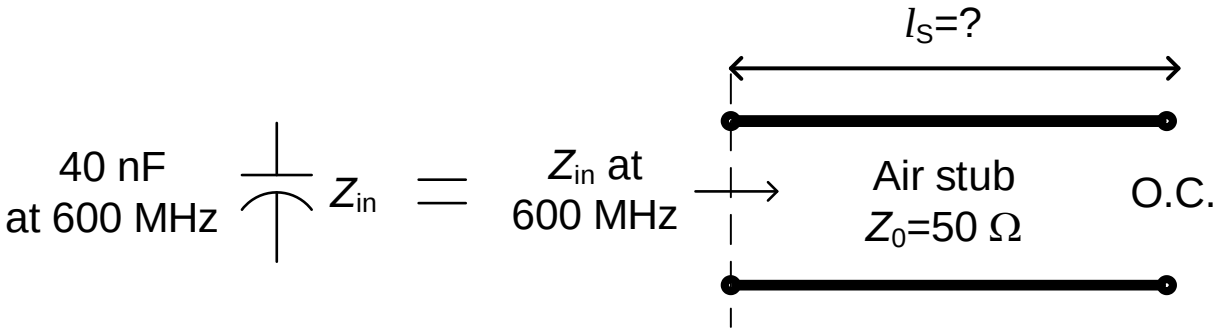


Inan problem # 7: Design a Capacitor Using a Stub.

(a) Design a 40 nF capacitor using a short-circuit terminated 50 Ω air stub at 600 MHz. (That is, the input impedance of the 50 Ω short-circuited air stub will equal to the impedance of the 40 nF capacitor at 600 MHz.)



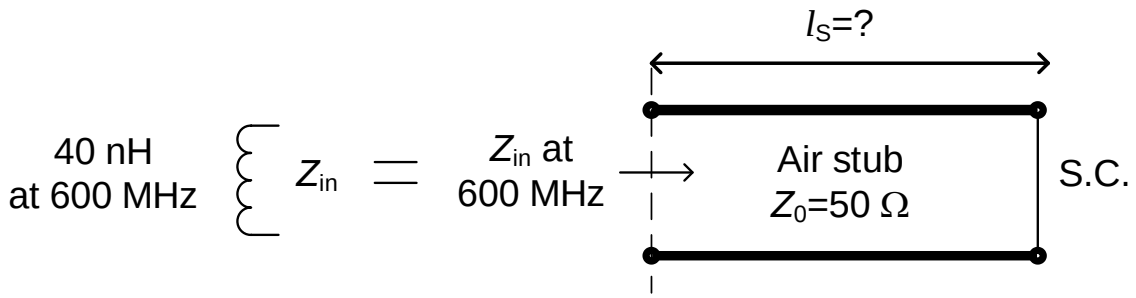
(b) Design a 40 nF capacitor using an open-circuit terminated 50 Ω air stub at 600 MHz.



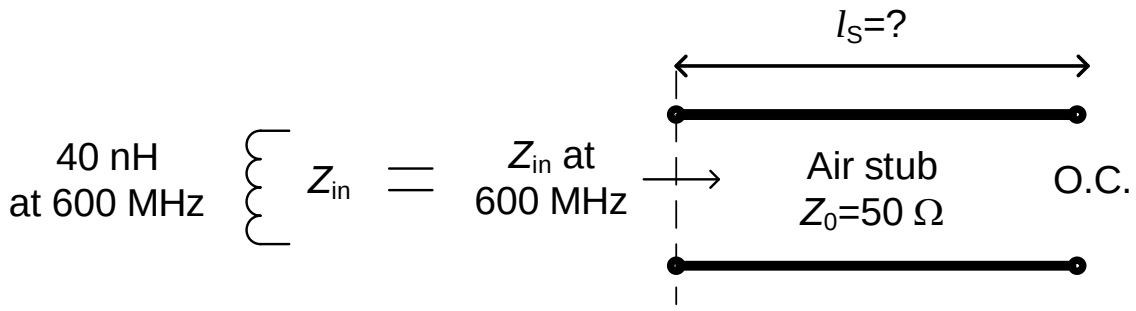
(c) Compare the stub lengths of parts (a) and (b) and comment.
(d) Repeat parts (a) and (b) at 1.2 GHz.

Inan problem # 8: Design an Inductor Using a Stub.

(a) Design a 40 nH inductor using a short-circuit terminated 50 Ω air stub at 600 MHz.



(b) Design a 40 nH inductor using an open-circuit terminated 50 Ω air stub at 600 MHz.



(c) Compare the stub lengths of parts (a) and (b) and comment.

(d) Repeat parts (a) and (b) at 1.2 GHz.

Please use the following guidelines for your homework solutions:

1) On the first sheet, at the top center, write: Homework #5-Solutions.
2) Provide your full name on the upper right corner of the first sheet.
3) Also write: EE 301/Spring 2018 on the upper left corner of the first sheet.
4) Solve each problem on a separate sheet unless your solution is very short.
5) Box all of your answers.
6) Staple your solutions in the above order before you turn them in.

Please turn in your homework on time.