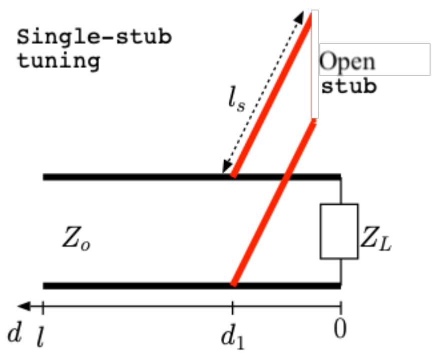
Lecture 39

1 Single-stub tuning with open ended stub



We can also use and open-ended red TL for the single-stub tuning and get a matched impedance.

a) Find position d_1 where to insert the open-ended stub;
b) Calculate normalized admittance $y(d_1)$ for the black TL.
c) Calculate normalized admittance y_{stub} for the red TL.
d) Find the length l_s of the red shorted-stub.

Part a-c will be exactly the same as the shorted-stub.

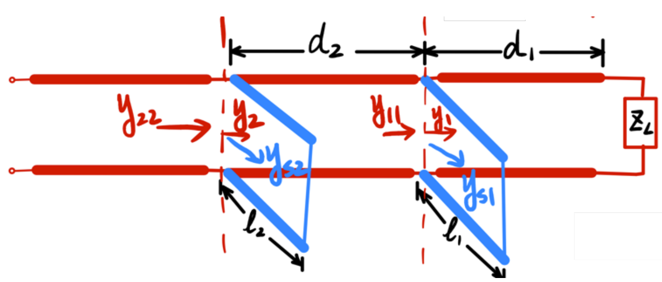
Part d). we need to rotate from open-ended load side to y_{stub}.

- For open terminal, the admittance $y_{LS} = 0$.
- Rotate y_{LS} towards generator to y_{stub}, to find the length of the red TL l_s.

Disadvantage of single-stub tuning:

a) For different load impedance Z_L or frequency, the position d_1 and stub length l_s will be changing.
b) It's very difficult to find the exact position d_1 on the original transmission line.

2 Double-stub tuning with short ended stub



- Position d_1 and d_1 are fixed (easy to implement)

  For example, $d_1 = 0$ or $\lambda/4$;

  $d_2 = \lambda/8,\ \lambda/4,\ or\ 3\lambda/8$
- Stub length l_{s1} and l_{s2} are varying with different Z_L

Step 1: normalize load impedance z_L

Step 2: plot z_L on Smith chart

Step 3: Find y_L on smith chart

Extend the z_L point through the center of the Smith Chart (in opposite direction, 180°, with same distance)

Step 4: Draw *(1+ jb) circle* and rotate it with the distance d_2 chosen for the solution,

$(d_2 =.$)

Step 5: Move on constant real value circle, until it intersect the *rotated (1+ jb) circle*

Step 6: Find the difference between y_1 (same as y_L for this example) point and y_{11}

$y_{s2} = y_{11} - y_L$

Step 7: Calculate the shunt line length l_1

From short circuit point for admittance to this susceptance value

Step8: find the corresponding point for y_{11} on the original $(1 + jb)$ circle

Step 9: find the susceptance of second stub

Step 10: calculate the shunt line length l_2