

The diagram shows a transmission line of length $l=0$ (labeled at the bottom). The input port (1) is on the left, with voltage V_1 and current I_1 entering. The output port (2) is on the right, with voltage V_2 and current I_2 leaving. The transmission line is represented by two horizontal lines. A shunt load is connected between the top and bottom lines at the center. The load is represented by a vertical rectangle with the value $\frac{4Z_0}{3}$ written next to it. The characteristic impedance of the transmission line is Z_0 , indicated by the labels $Z_0/3$ on the top line segments and Z_0 on the bottom line segments. The input and output ports are labeled with circled numbers 1 and 2 respectively.

$$z_1 = \frac{z_0}{3} + \left(\frac{z_0}{3} \parallel \frac{4z_0}{3} \right) = \frac{z_0}{3} + \frac{\frac{4z_0^2}{9}}{\frac{5z_0}{3}} = \frac{z_0}{3} + \frac{4z_0}{15} = \frac{9z_0}{15}$$

★ Bulunan 5 değer-
leri ve matris incelen-
diğinde ve simetri göz
önüne alındığında hatın
"kayıpsız" olduğu görülür

★ dikkat simetrik olduğundan $S_{22} = S_{11} = -\frac{1}{4}$ olur.

★ devre simetrik olduğundan $S_{11} = S_{22}$ olduğundan 2. port kapatılırsa $V_1^+ = V_1$ ve $V_2^- = V_2$ olur.

$$\Rightarrow V_2^- = V_2 = V_1 \left(\frac{z_0 - \frac{z_0}{3}}{z_0} \right) \left(\frac{z_0}{z_0 + \frac{z_0}{3}} \right) = \frac{2}{4} = \frac{1}{2} V_1$$

$S_{12} = S_{21} = \frac{1}{2}$ olarak buluruz. $S = \begin{bmatrix} -1/4 & 1/2 \\ 1/2 & -1/4 \end{bmatrix}$