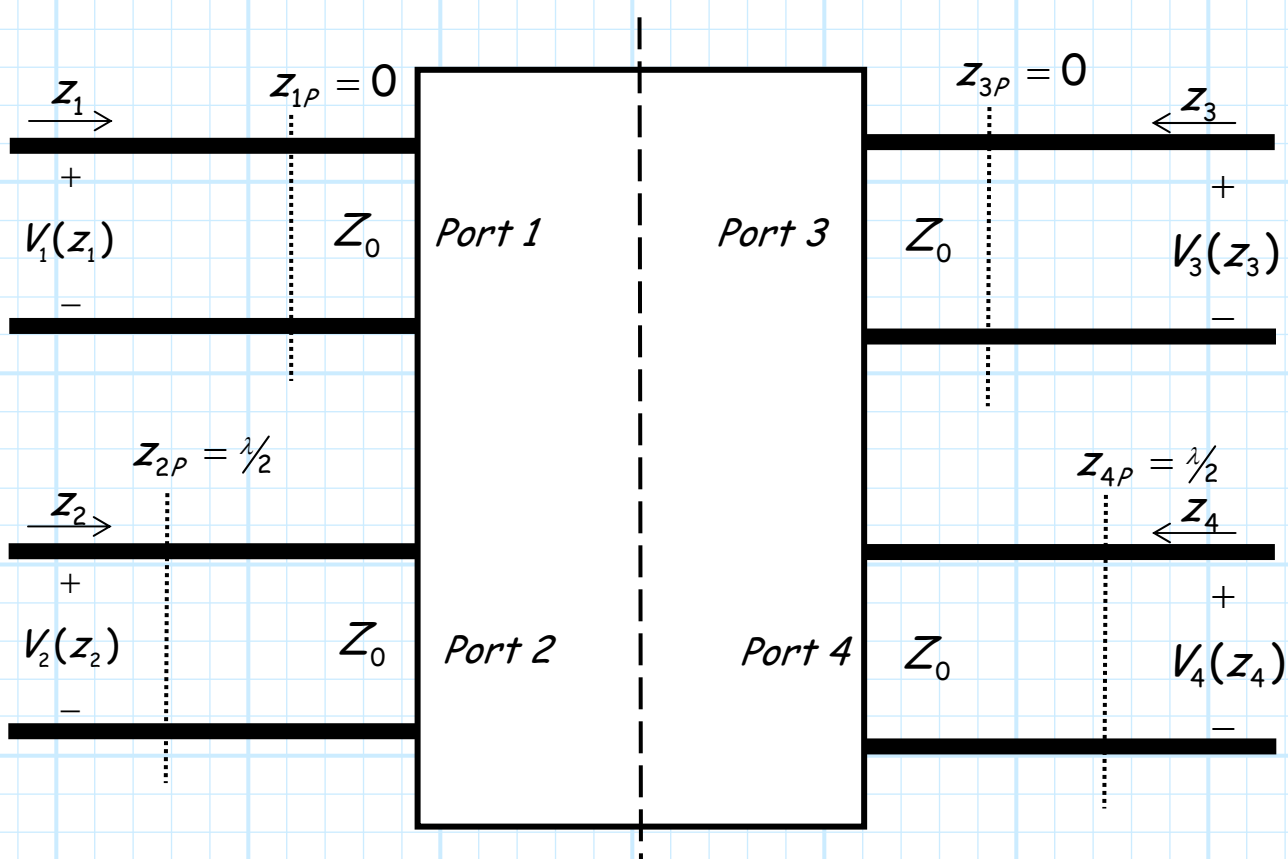


Special Problem 4.3-15

The following things are known about the 4-port device below:

1. It is **reciprocal**.
2. $S_{22} = 0.1$ and $S_{42} = 0.14$.
3. It has a plane of reflection **symmetry**, such that it is identical under the permutation $1 \rightarrow 3, 2 \rightarrow 4, 3 \rightarrow 1, 4 \rightarrow 2$



Note the location of port 2 and port 4 (i.e., $z_{2P} = z_{4P} = \lambda/2$)!!!!

Turn the page!!!

Now **carefully** consider the **voltages** along each of the **four** transmission lines connected to this 4-port device:

$$V_1(z_1) = j0.4 e^{j\beta z_1}$$

$$V_2(z_2) = 0.2 e^{j\beta z_2}$$

$$V_3(z_3) = 2.0 e^{-j\beta z_3} + 0.5 e^{j\beta z_3}$$

$$V_4(z_4) = 0.3 e^{j\beta z_4}$$

Use all of the above information to determine **scattering matrix** of this device.