

# Example – Coupled Lines

## Subscripts

1,2,C,D    line 1, line 2, common mode,  
differential mode

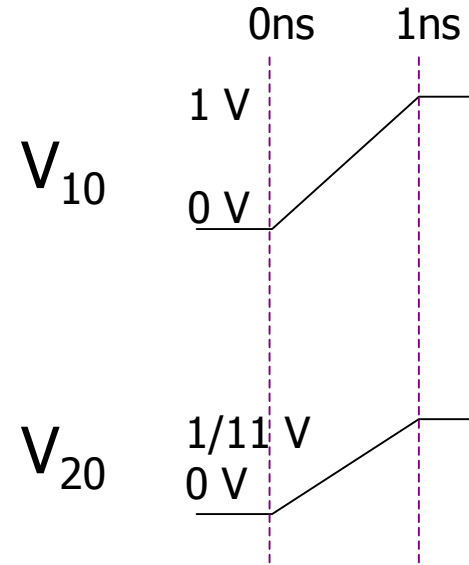
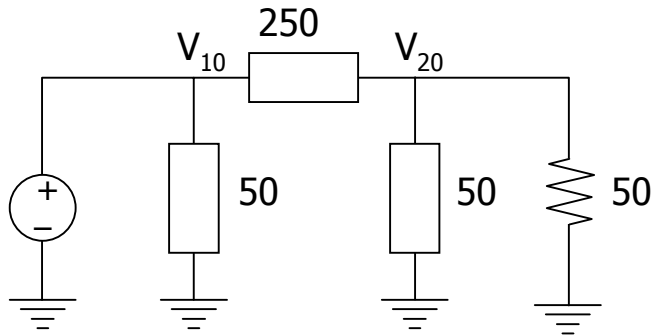
$$V_C = \frac{V_1 + V_2}{2} \quad V_D = \frac{V_1 - V_2}{2}$$

0, l    position:  $x=0$ ,  $x=l$

f, r    forward wave, backward wave,  
no f or r indicates total voltage

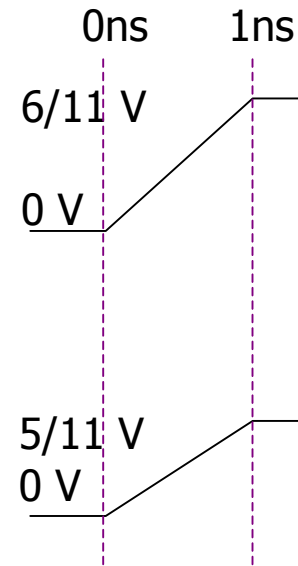


$t = 0^+ \quad x = 0$



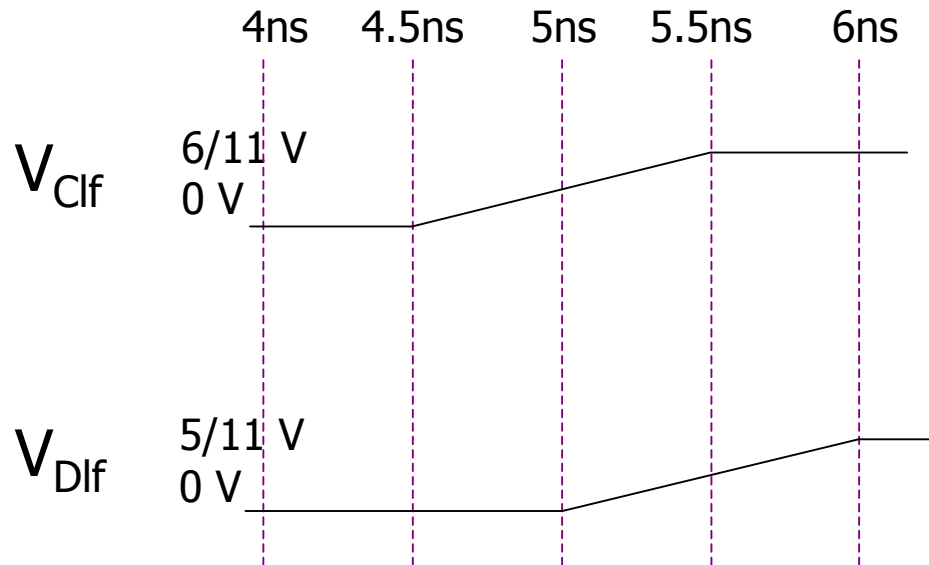
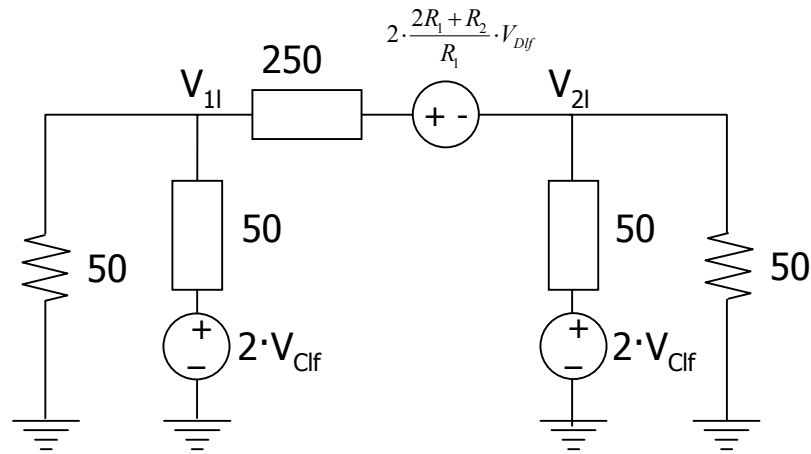
$$V_{C0} = \frac{12}{11} \cdot \frac{1}{2} = \frac{6}{11}$$

$$V_{D0} = \frac{10}{11} \cdot \frac{1}{2} = \frac{5}{11}$$



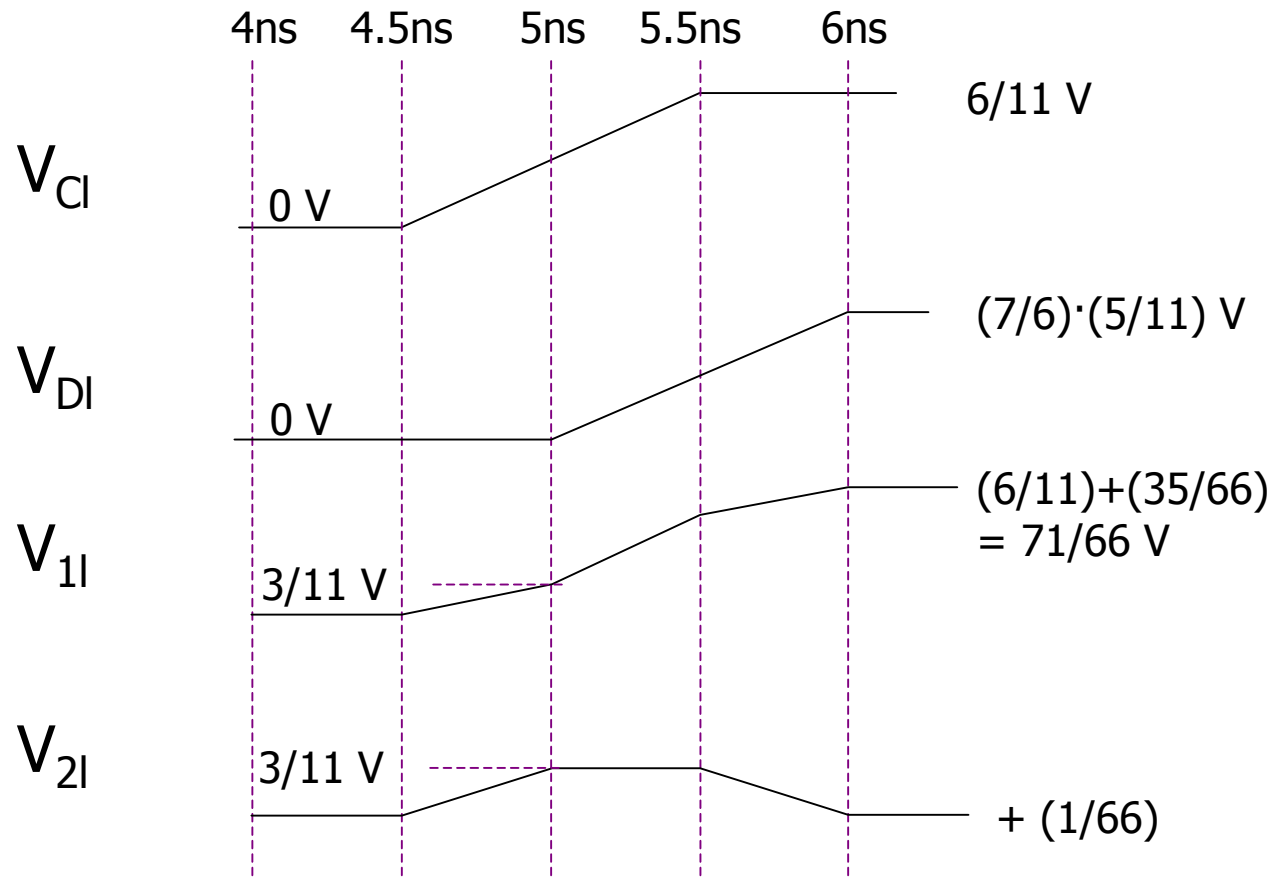
$$t = 1/v+$$

$$x = 1$$



$$V_{1l} = \left( V_{Clf} \cdot \frac{1+1}{2} + V_{Dlf} \cdot 2 \cdot \frac{350}{50} \cdot \frac{25}{300} \right) = V_{Clf} + \frac{7}{6} V_{Dlf}$$

$$V_{2l} = V_{Clf} - \frac{7}{6} V_{Dlf}$$



If matched termination

$$t = l/v+ \quad x = l$$

$$V_{1l} = \left( V_{Clf} + V_{Dlf} \cdot 2 \cdot 7 \cdot \frac{1}{2} \cdot \frac{25}{175} \right) = 1$$

