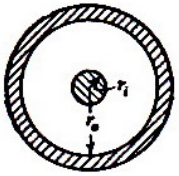
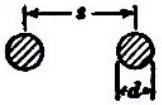
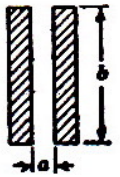
From S. Ramo et al., *Fields and Waves in Communication Electronics*, Wiley, 1965, 1984.

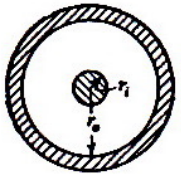
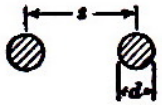
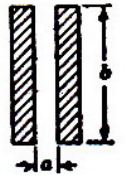
Transmission Line Parameters

Here, $\sigma = \omega\varepsilon''$ refers to the conductivity of the dielectric between the conductors.				 Formulas for $a \ll b$
Capacitance C, farads/meter	$\dfrac{2\pi\epsilon}{\ln\left(\frac{r_0}{r_i}\right)}$	$\dfrac{\pi\epsilon}{\cosh^{-1}\left(\frac{s}{d}\right)}$		$\dfrac{\epsilon\, b}{a}$
External inductance L, henrys/meter	$\dfrac{\mu}{2\pi}\ln\left(\dfrac{r_0}{r_i}\right)$	$\dfrac{\mu}{\pi}\cosh^{-1}\left(\dfrac{s}{d}\right)$		$\mu\,\dfrac{a}{b}$
Conductance G, siemens/meter	$\dfrac{2\pi\sigma}{\ln\left(\frac{r_0}{r_i}\right)} = \dfrac{2\pi\omega\epsilon''}{\ln\left(\frac{r_0}{r_i}\right)}$	$\dfrac{\pi\sigma}{\cosh^{-1}\left(\frac{s}{d}\right)} = \dfrac{\pi\omega\epsilon''}{\cosh^{-1}\left(\frac{s}{d}\right)}$		$\dfrac{\sigma\, b}{a} = \dfrac{\omega\epsilon''b}{a}$
AC or RF Resistance R, ohms/meter	$\dfrac{R_s}{2\pi}\left(\dfrac{1}{r_0}+\dfrac{1}{r_i}\right)$	$\dfrac{2R_s}{\pi d}\left[\dfrac{s/d}{\sqrt{(s/d)^2-1}}\right]$		$\dfrac{2R_s}{b}$

$$R_s \equiv \frac{1}{\sigma\delta} \qquad \delta \equiv \frac{1}{\sqrt{\pi f \mu \sigma}}$$ (skin depth)

Here, σ refers to the conductivity of the conductor.

Transmission Line Parameters

			 Formulas for $a \ll b$
Characteristic impedance at high frequency Z_0, ohms	$\frac{\eta}{2\pi} \ln\left(\frac{r_0}{r_i}\right)$	$\frac{\eta}{\pi} \cosh^{-1}\left(\frac{s}{d}\right)$	$\eta \frac{a}{b}$
Z_0 for air dielectric	$60 \ln\left(\frac{r_0}{r_i}\right)$	$120 \cosh^{-1}\left(\frac{s}{d}\right) \cong 120 \ln\left(\frac{2s}{d}\right)$ if $s/d \gg 1$	$120\pi \frac{a}{b}$
Attenuation due to conductor α_c	$\frac{R}{2Z_0}$		
Attenuation due to dielectric α_d	$\frac{GZ_0}{2} = \frac{\sigma\eta}{2}$		
Total attenuation dB/meter	$8.686(\alpha_c + \alpha_d)$		
Phase constant for low-loss lines β	$\omega\sqrt{\mu\epsilon} = \frac{2\pi}{\lambda}$		