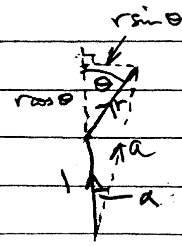
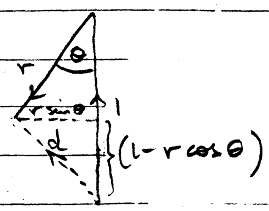
Allowable Phase & Ampl.

14 May 99



$$a^2 = (1 + r\cos\theta)^2 + r^2\sin^2\theta$$
$$= (1 + r^2) + 2r\cos\theta$$

$$\tan\alpha = \frac{r\sin\theta}{1 + r\cos\theta}$$



$$d^2 = (1 - r\cos\theta)^2 + r^2\sin^2\theta$$
$$= (1 + r^2) - 2r\cos\theta$$

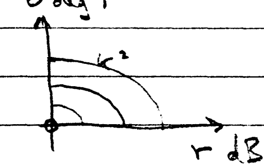
$$\frac{d^2}{a^2} = \frac{(1+r^2) - 2r\cos\theta}{(1+r^2) + 2r\cos\theta}$$

For fixed $\frac{d^2}{a^2} = K^2$, $(1+r^2) - 2r\cos\theta = K^2\left[(1+r^2) + 2r\cos\theta\right]$

$$\therefore (1+r^2)(1-K^2) = 2r\cos\theta\,(1+K^2)$$

for each value of K, r, $\cos\theta = \frac{1+r^2}{2r} \cdot \frac{1-K^2}{1+K^2}$

Plot θ vs r(dB) for various K^2 values



At $r_{\substack{max\\min}}$: $1 = \frac{1+r^2}{2r} \cdot \frac{1-K^2}{1+K^2}$ $\therefore 2r(1+K^2) = (1+r^2)(1-K^2)$

$$r^2 - \frac{2r(1+K^2)}{1-K^2} + 1 = 0$$

$$\therefore r_{\substack{max\\min}} = \frac{1+K^2}{1-K^2} \pm \sqrt{\left(\frac{1+K^2}{1-K^2}\right)^2 - 1}$$

$\frac{(1-a)^2}{(1+a)^2} = \frac{1}{100}$

$\frac{1+a}{1-a} = 10$

$11a = 10 - 10a$

$11a = 9$

$= \frac{9}{11}$

$K^2 = 0$: $r_{min} = 1$

$K^2 = 0.1$: $r_{min} = \frac{1.1}{0.9} \pm \sqrt{\left(\frac{1.1}{0.9}\right)^2 - 1} = 0.5195$, $r_{min}^2 = 0.27 = 5.7$

$K^2 = 0.01$: $r_{min} = \frac{1.01}{0.99} \pm \sqrt{\left(\frac{1.01}{0.99}\right)^2 - 1} = 0.8182$, $r_{min}^2 = 0.669 = 1$

For 50 points, choose r values: $r_{min} + (1 - r_{min})\cos\left(\frac{n}{50} \cdot \frac{\pi}{2}\right)$.

r_{min}