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Neglecting Absorption, we can define the cuttoff frequency for the 2-D semi-infinite cylindrical waveguide as

$$\frac{\omega}{c} = \frac{2\pi f}{c} < \frac{\alpha_{11}}{a}$$

f satisfies this inequality, then $n=1$ is evanescent, and only the plane mode propagates. At the boundary, the cuttoff frequency f_c then is

cylindrical	rectangular
$f_c = \frac{\alpha_{11} c}{2\pi a} = 1.21 \frac{c}{2a} = 2(1.21)\frac{c}{2\cdot(2a)}$	$\frac{c}{2L_y}$

University of Idaho **From slide 37/8 should be**

$$\int_0^a r J_0\left(\alpha 1_n \frac{r}{a}\right) J_0\left(\alpha 1_m \frac{r}{a}\right) dr = \frac{a^2}{2}\left[J_1(\alpha 1_n)\right]^2 \quad n=m$$

From slide 37/9 should be

$$A_n = \frac{1}{\frac{a^2}{2}\left[J_1(\alpha 1_n)\right]^2} \frac{\rho_a \omega}{k_z} \int_0^a r J_0\left(\alpha 1_n \frac{r}{a}\right) u_0 f(r)\, dr$$