

Expressions for the field components of the E_{mnp} waves in a rectangular resonator.

$$\begin{aligned}
 E_x &= -E_{x0} \cos\left(\frac{m\pi}{a}x\right) \sin\left(\frac{n\pi}{b}y\right) \sin\left(\frac{p\pi}{d}z\right) \cos(\omega_{rez}t); \\
 E_y &= -E_{y0} \sin\left(\frac{m\pi}{a}x\right) \cos\left(\frac{n\pi}{b}y\right) \sin\left(\frac{p\pi}{d}z\right) \cos(\omega_{rez}t); \\
 E_z &= E_{z0} \sin\left(\frac{m\pi}{a}x\right) \sin\left(\frac{n\pi}{b}y\right) \cos\left(\frac{p\pi}{d}z\right) \cos(\omega_{rez}t); \\
 H_x &= H_{x0} \sin\left(\frac{m\pi}{a}x\right) \cos\left(\frac{n\pi}{b}y\right) \cos\left(\frac{p\pi}{d}z\right) \cos\left(\omega_{rez}t + \frac{\pi}{2}\right); \\
 H_y &= H_{y0} \cos\left(\frac{m\pi}{a}x\right) \sin\left(\frac{n\pi}{b}y\right) \cos\left(\frac{p\pi}{d}z\right) \cos\left(\omega_{rez}t - \frac{\pi}{2}\right); \\
 H_z &= 0;
 \end{aligned}$$

Expressions for the field components of the H_{mnp} waves in a rectangular resonator.

$$\begin{aligned}
 H_x &= -H_{x0} \sin\left(\frac{m\pi}{a}x\right) \cos\left(\frac{n\pi}{b}y\right) \cos\left(\frac{p\pi}{d}z\right) \cos(\omega_{rez}t); \\
 H_y &= -H_{y0} \cos\left(\frac{m\pi}{a}x\right) \sin\left(\frac{n\pi}{b}y\right) \cos\left(\frac{p\pi}{d}z\right) \cos(\omega_{rez}t); \\
 H_z &= H_{z0} \cos\left(\frac{m\pi}{a}x\right) \cos\left(\frac{n\pi}{b}y\right) \sin\left(\frac{p\pi}{d}z\right) \cos(\omega_{rez}t); \\
 E_x &= E_{x0} \cos\left(\frac{m\pi}{a}x\right) \sin\left(\frac{n\pi}{b}y\right) \sin\left(\frac{p\pi}{d}z\right) \cos\left(\omega_{rez}t + \frac{\pi}{2}\right); \\
 E_y &= E_{y0} \sin\left(\frac{m\pi}{a}x\right) \cos\left(\frac{n\pi}{b}y\right) \sin\left(\frac{p\pi}{d}z\right) \cos\left(\omega_{rez}t - \frac{\pi}{2}\right); \\
 E_z &= 0;
 \end{aligned}$$

$$\omega_{rez} = 2\pi f_{rez}; \quad f_{rez} = \frac{c}{2} \sqrt{\left(\frac{m}{a}\right)^2 + \left(\frac{n}{b}\right)^2 + \left(\frac{p}{d}\right)^2}.$$

H_{mnp} resonant frequency and wavelength in rectangular waveguide, 23x10x50 mm.

| m | n | p | f _{rez} , GHz | λ _{rez} , mm |
|---|---|---|------------------------|-----------------------|
| 1 | 0 | 1 | 7,18 | 41,79 |
| 1 | 0 | 2 | 8,86 | 33,85 |
| 1 | 0 | 3 | 11,11 | 26,99 |
| 2 | 0 | 1 | 13,38 | 22,41 |
| 1 | 0 | 4 | 13,66 | 21,97 |
| 2 | 0 | 2 | 14,36 | 20,90 |
| 0 | 1 | 1 | 15,30 | 19,61 |
| 2 | 0 | 3 | 15,85 | 18,93 |
| 0 | 1 | 2 | 16,16 | 18,57 |
| 1 | 0 | 5 | 16,36 | 18,34 |

E_{mnp} resonant frequency and wavelength in rectangular waveguide, 23x10x50 mm.

| m | n | p | f _{rez} , GHz | λ _{rez} , mm |
|---|---|---|------------------------|-----------------------|
| 1 | 1 | 0 | 16,36 | 18,34 |
| 1 | 1 | 1 | 16,63 | 18,04 |
| 1 | 1 | 2 | 17,42 | 17,22 |
| 1 | 1 | 3 | 18,67 | 16,07 |
| 2 | 1 | 0 | 19,88 | 15,09 |
| 2 | 1 | 1 | 20,10 | 14,92 |
| 1 | 1 | 4 | 20,29 | 14,79 |
| 2 | 1 | 2 | 20,76 | 14,45 |
| 2 | 1 | 3 | 21,82 | 13,75 |
| 1 | 1 | 5 | 22,19 | 13,52 |