Guias retangulares metálicos e guias de substrato integrado

Estruturas guiantes

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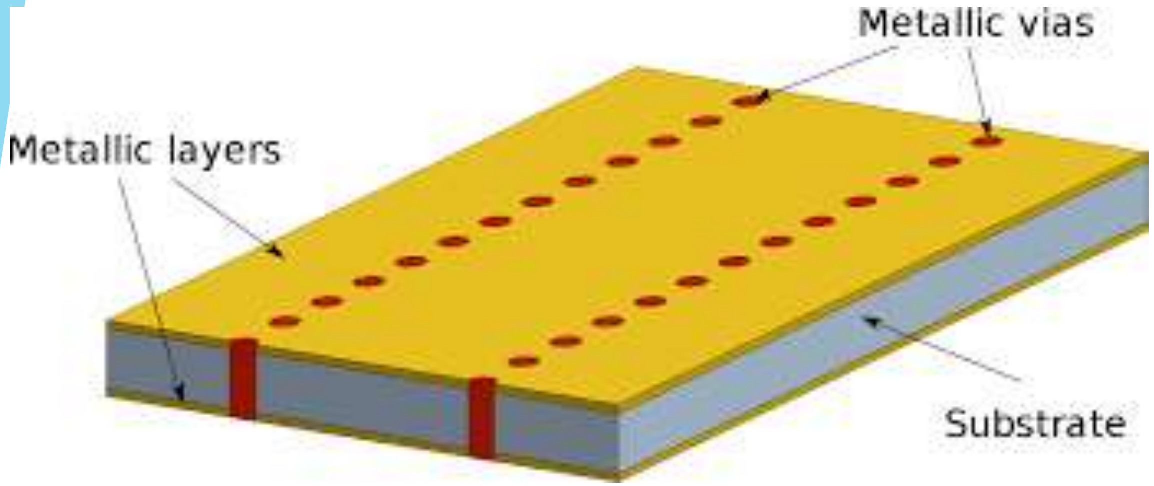
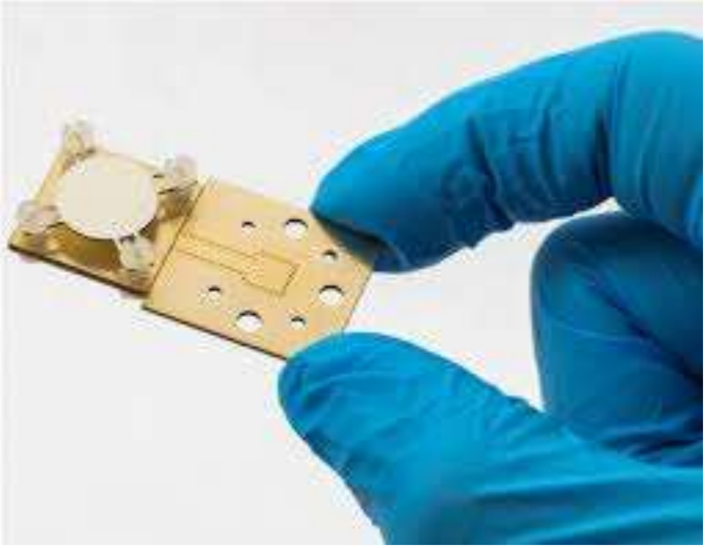
Sumário





Introdução

- Guias retangulares metálicos;
- Problema dimensional;
- Guias do tipo *SIW*.

Metodologia

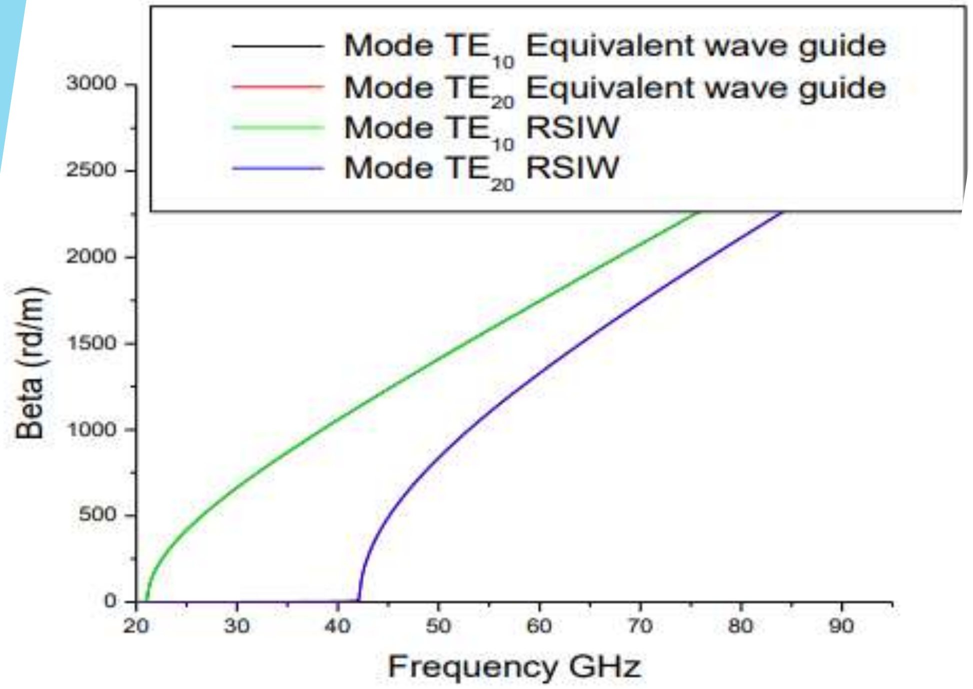
- Reprodução dos resultados da referência utilizada [2];
- Método de simulação (HFSS);
- Obtenção e apresentação dos dados.

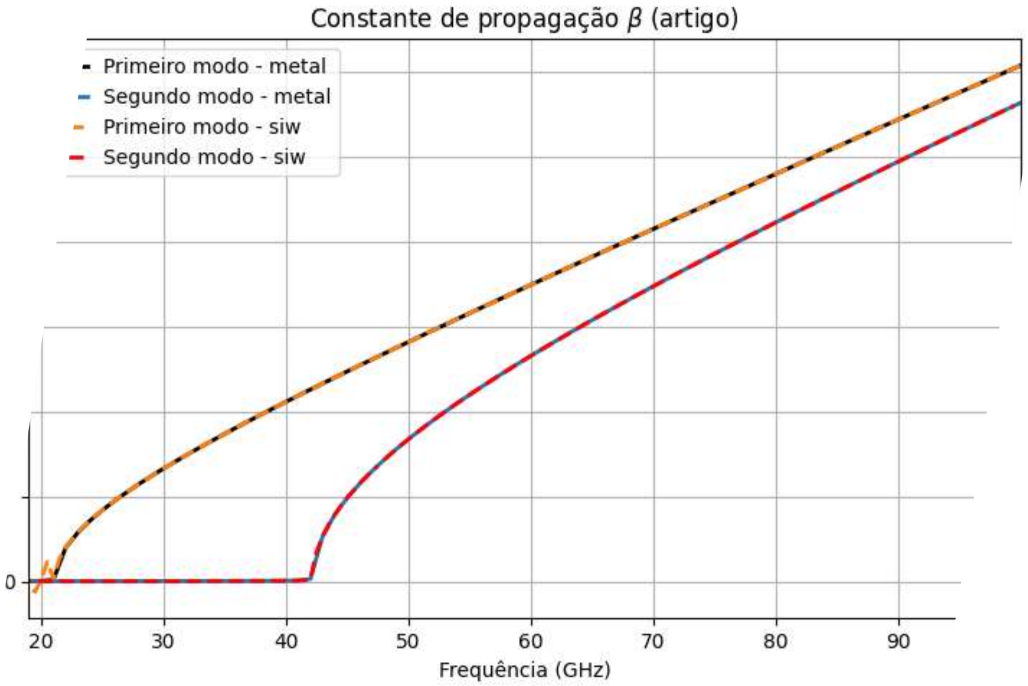
Equações

$$f_c = \frac{c}{2\sqrt{\epsilon_r \mu_r}} \sqrt{\left(\frac{m}{a}\right)^2 + \left(\frac{n}{b}\right)^2}.$$

$$W_{eq} = W_{SIW} - \frac{d^2}{0.95p}$$

```
def get_cutOffFrequecies(a,b,p,epslion_r,mi_r):
    '''
    :param a: largura do guia
    :param b: altura do guia
    :param p: numero de loops
    :param epslion_r: permissividade
    :param mi_r: permeabilidade
    :return: lista com frequencias de corte
    '''
    c_ = c/(np.sqrt(epsilon_r * mi_r))
    lista = []
    for m in range(0,p,1):
        for n in range(0,p,1):
            fc = ((c_/2)*np.sqrt( (m/a)**2 + (n/b)**2))
            lista.append((m, n, fc / giga))
    return lista
```



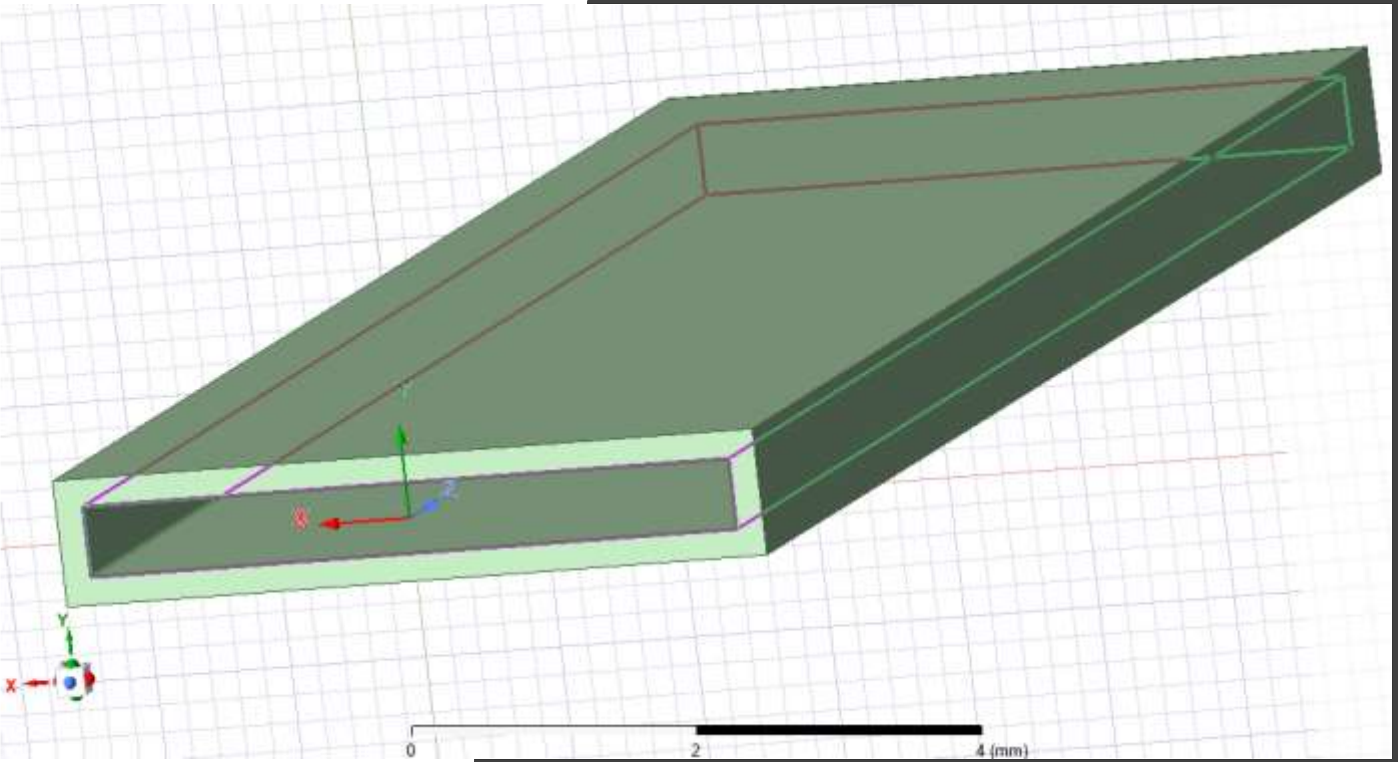


Reprodução dos dados do artigo

a = 4.795mm, b = 0.508mm, ϵr = 2.2 e μr = 1

m	n	$f_c(GHz)$
1	0	21.08
2	0	42.15
3	0	63.23

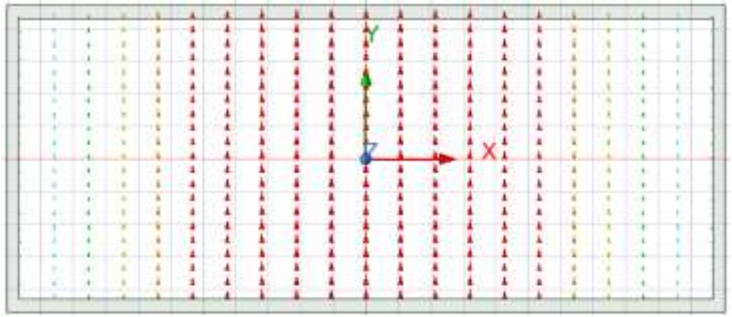
Guia retangular metálico oco

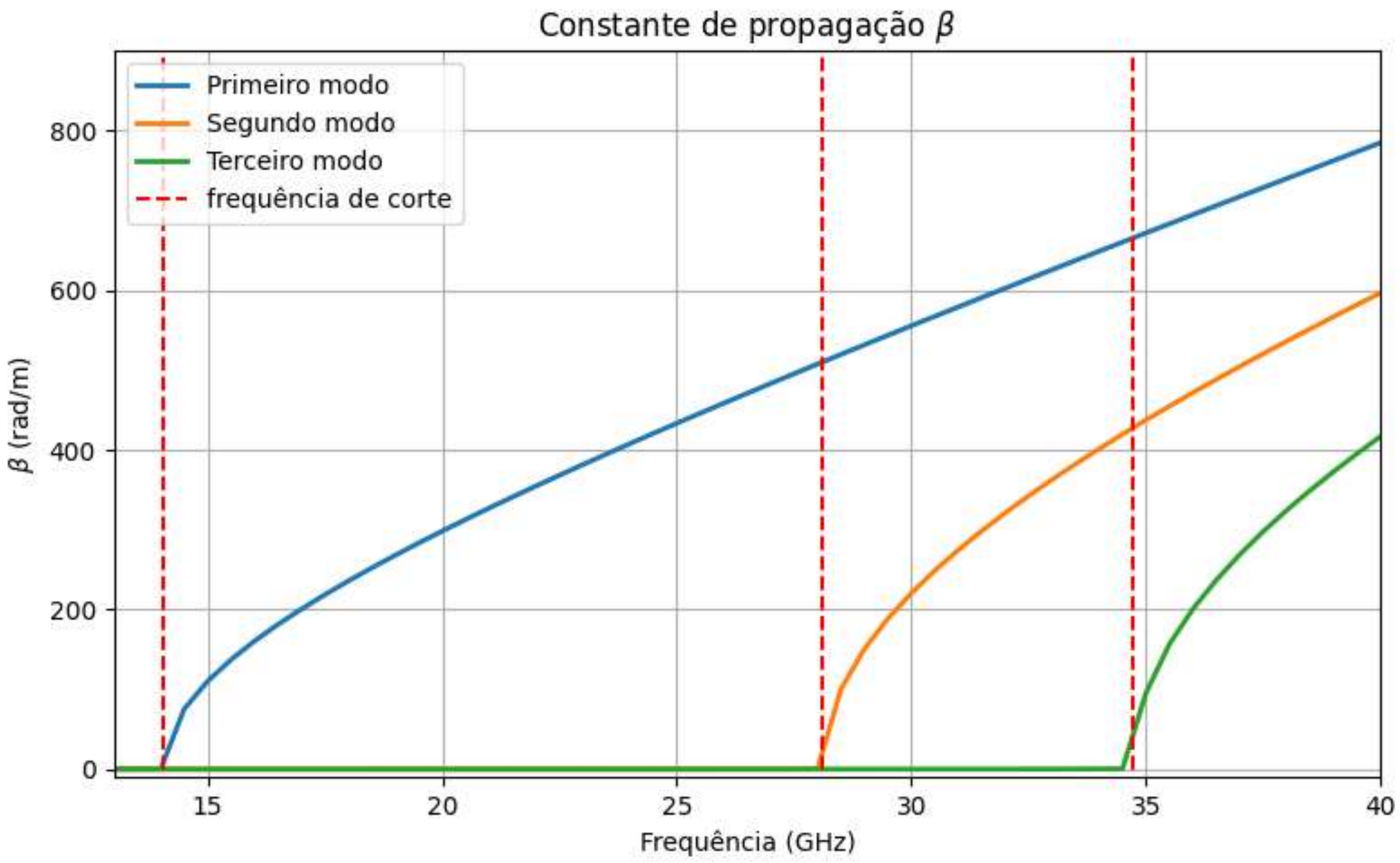


Guia retangular metálico oco

a = 10.668mm, b = 4.31mm,
L =16mm, ϵr = 1 e μr = 1

m	n	$f_c(GHz)$
1	0	14.05
2	0	28.10
0	1	34.71





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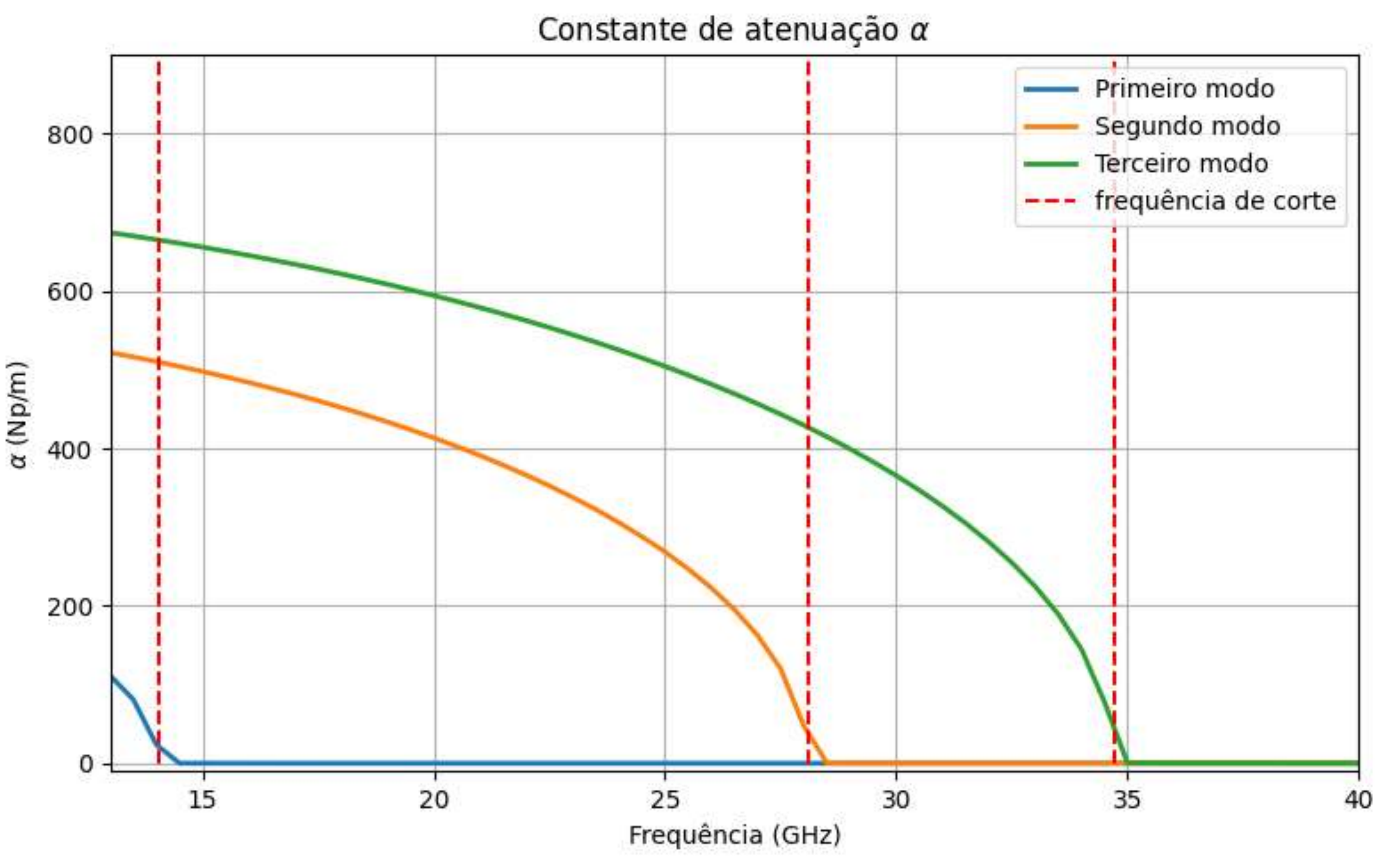

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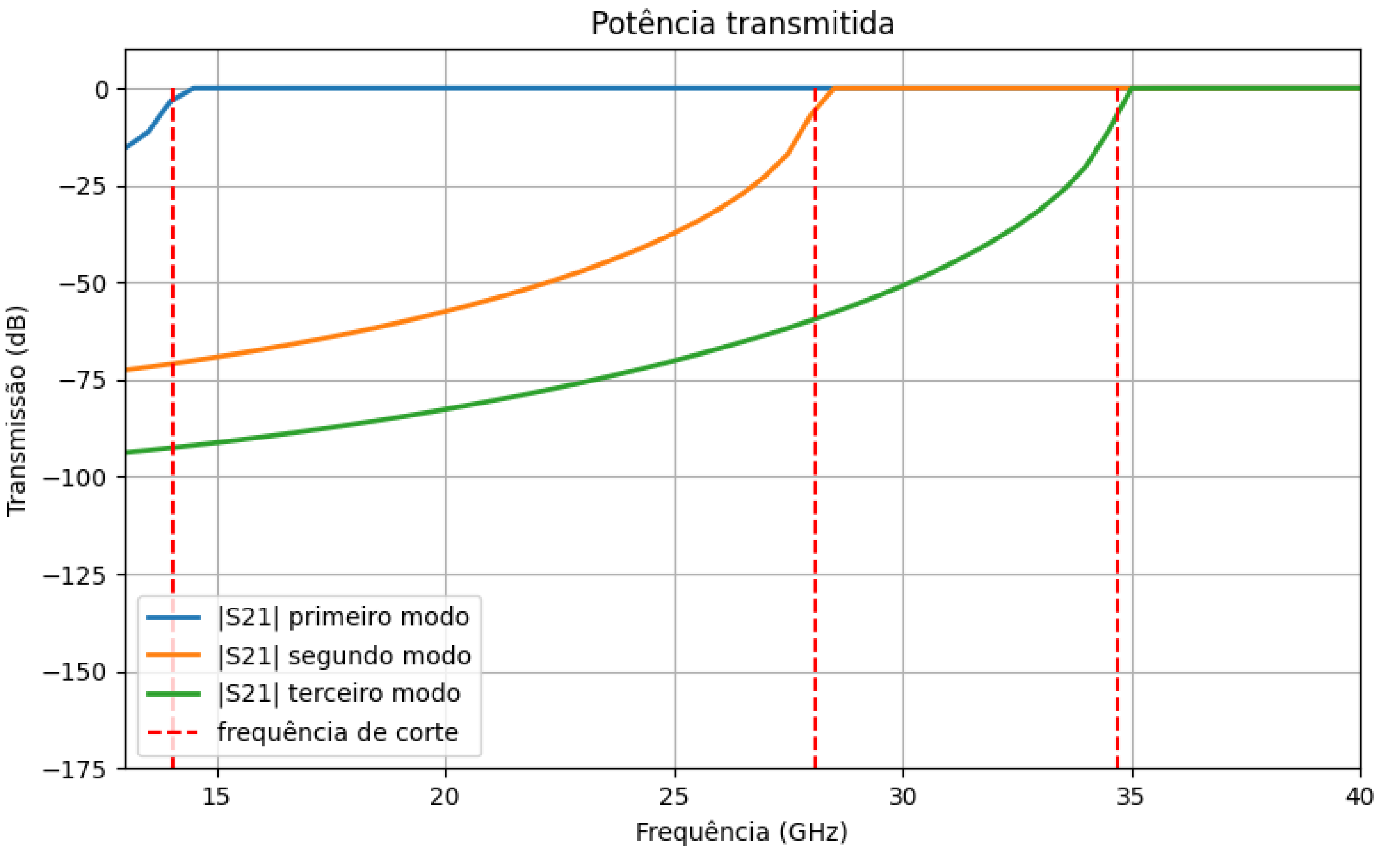

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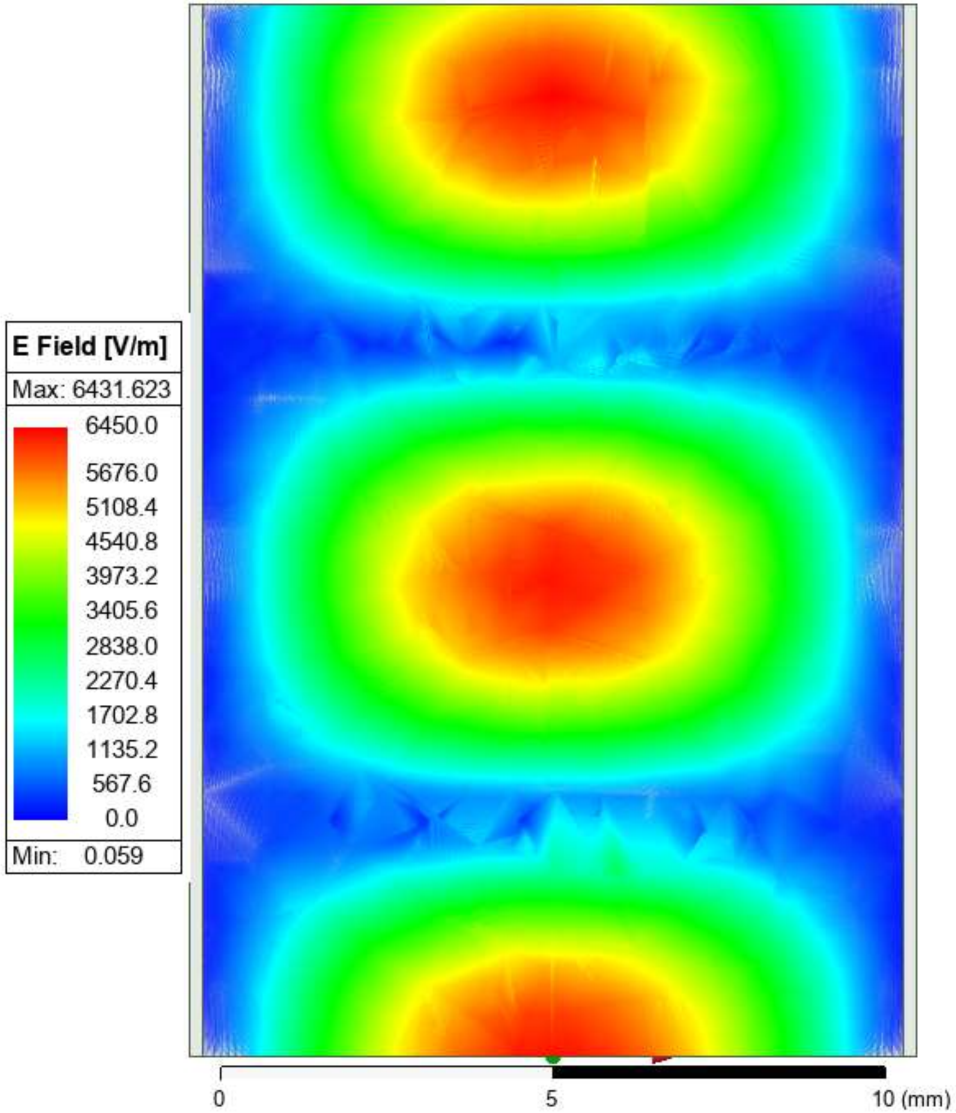
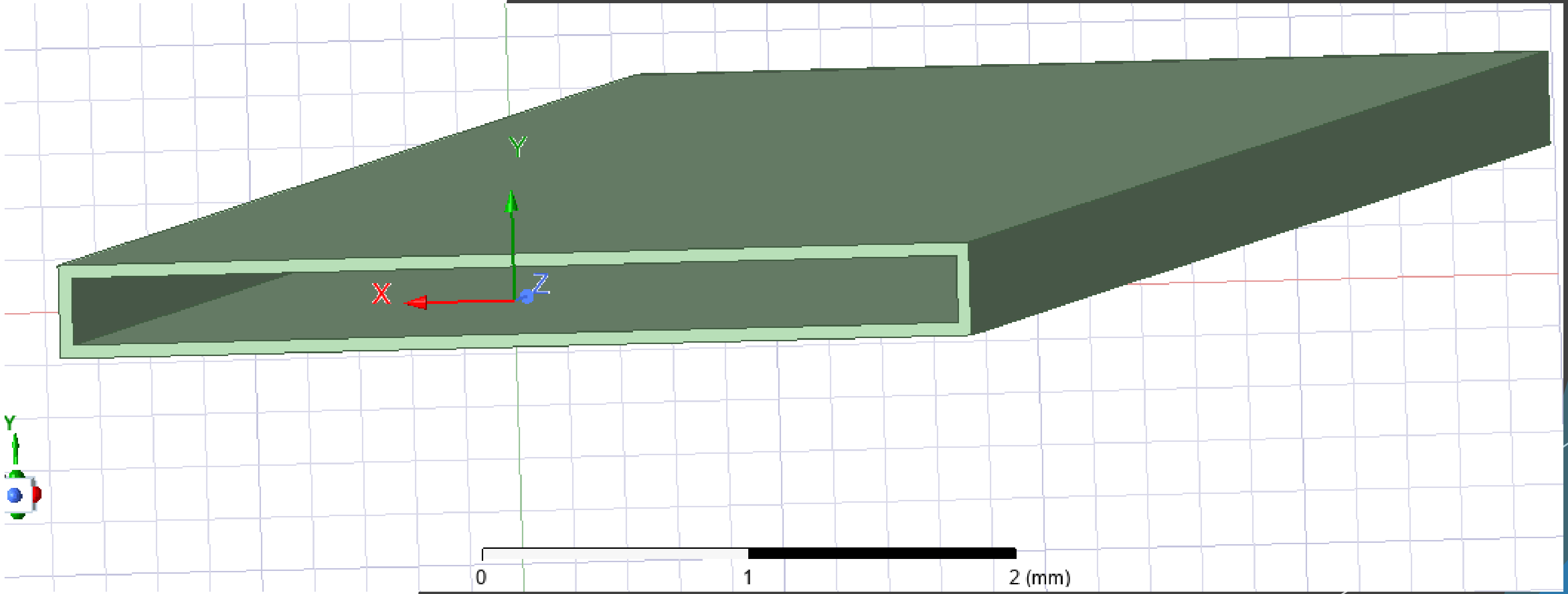
f=25GHz



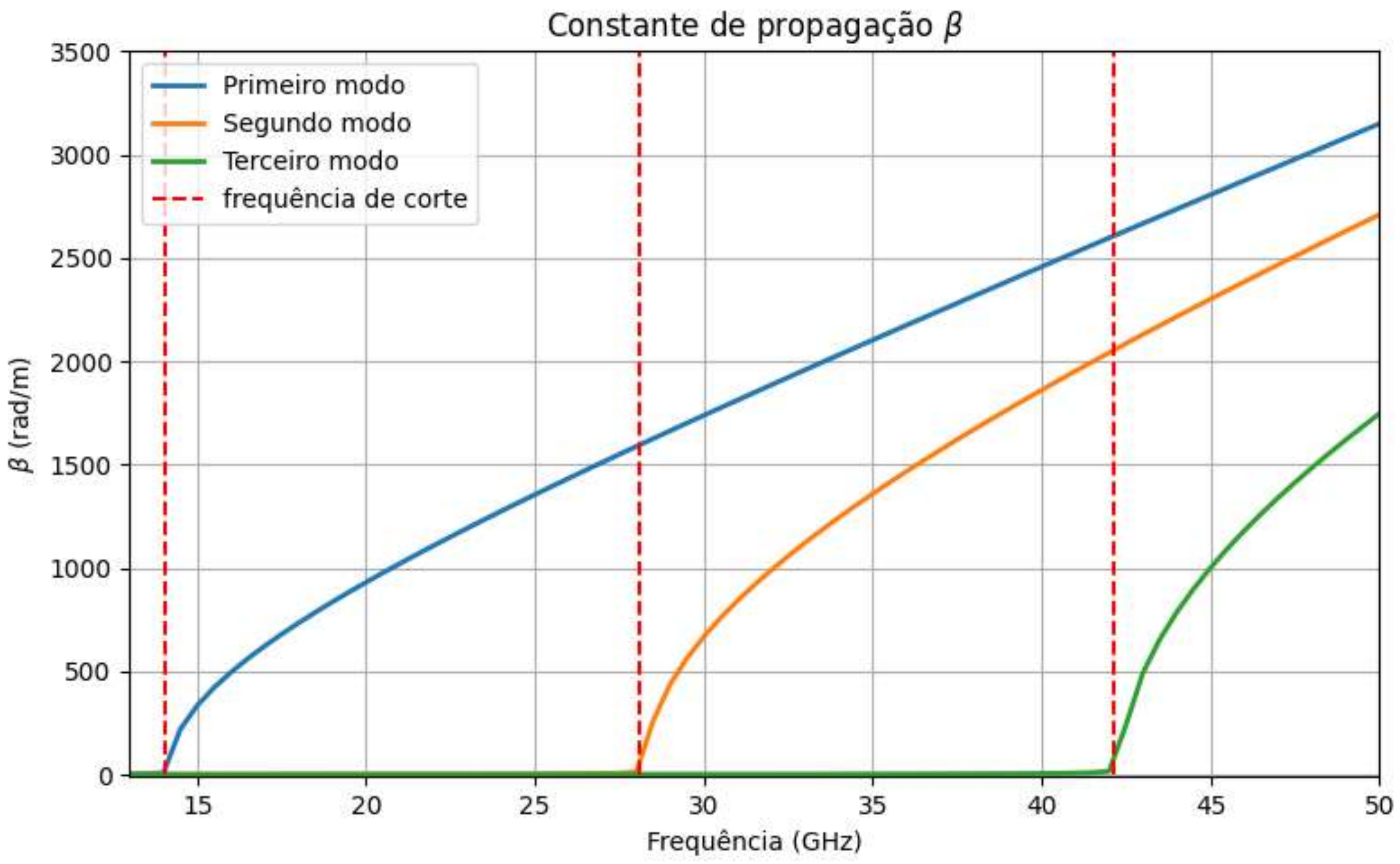
Guia retangular metálico com dielétrico



Guia retangular metálico com dielétrico

a = 3.39mm, b = 0.254mm,
L =16mm, ϵr = 9.9 e μr = 1

m	n	$f_c(GHz)$
1	0	14.05
2	0	28.11
3	0	42.16



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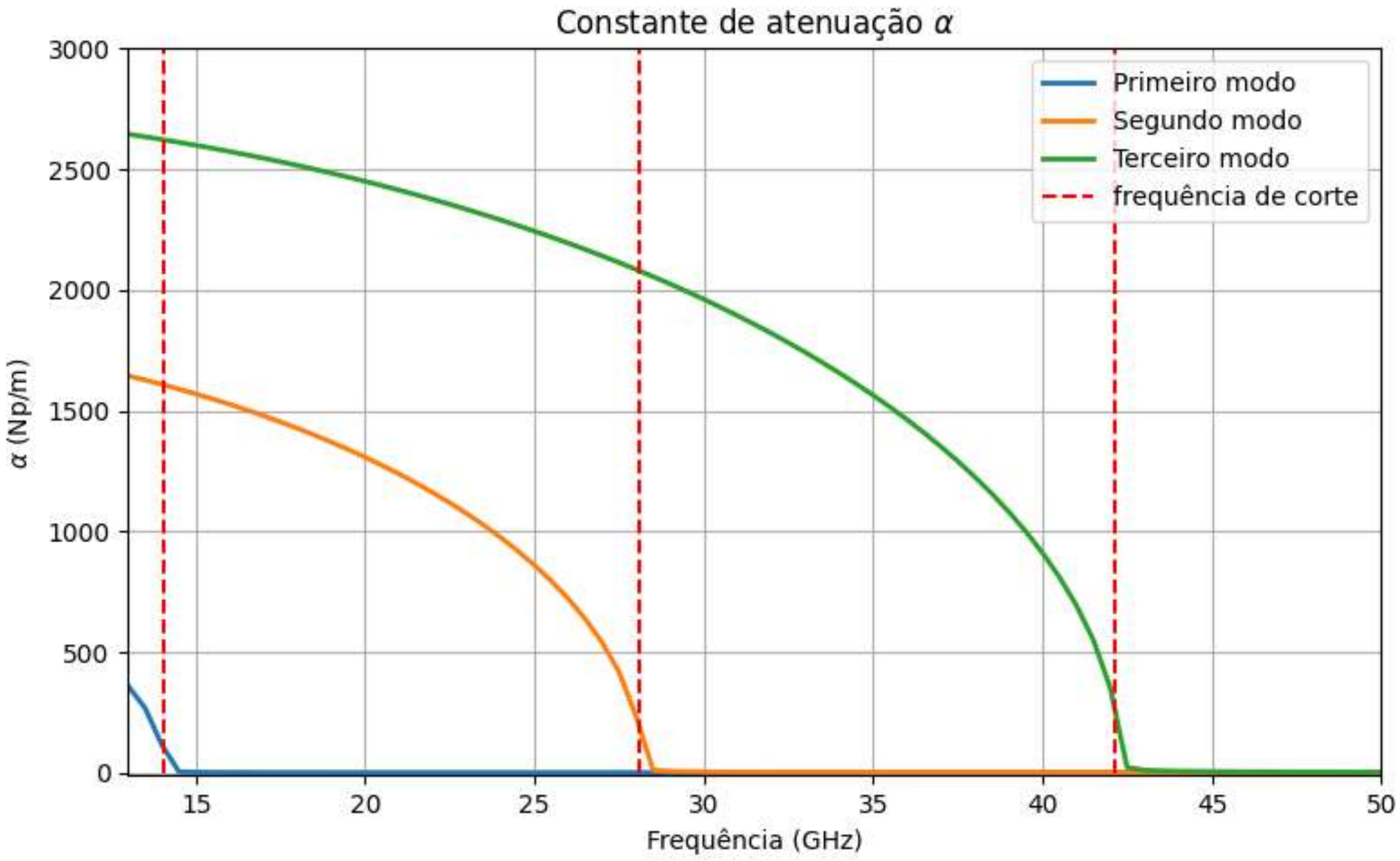

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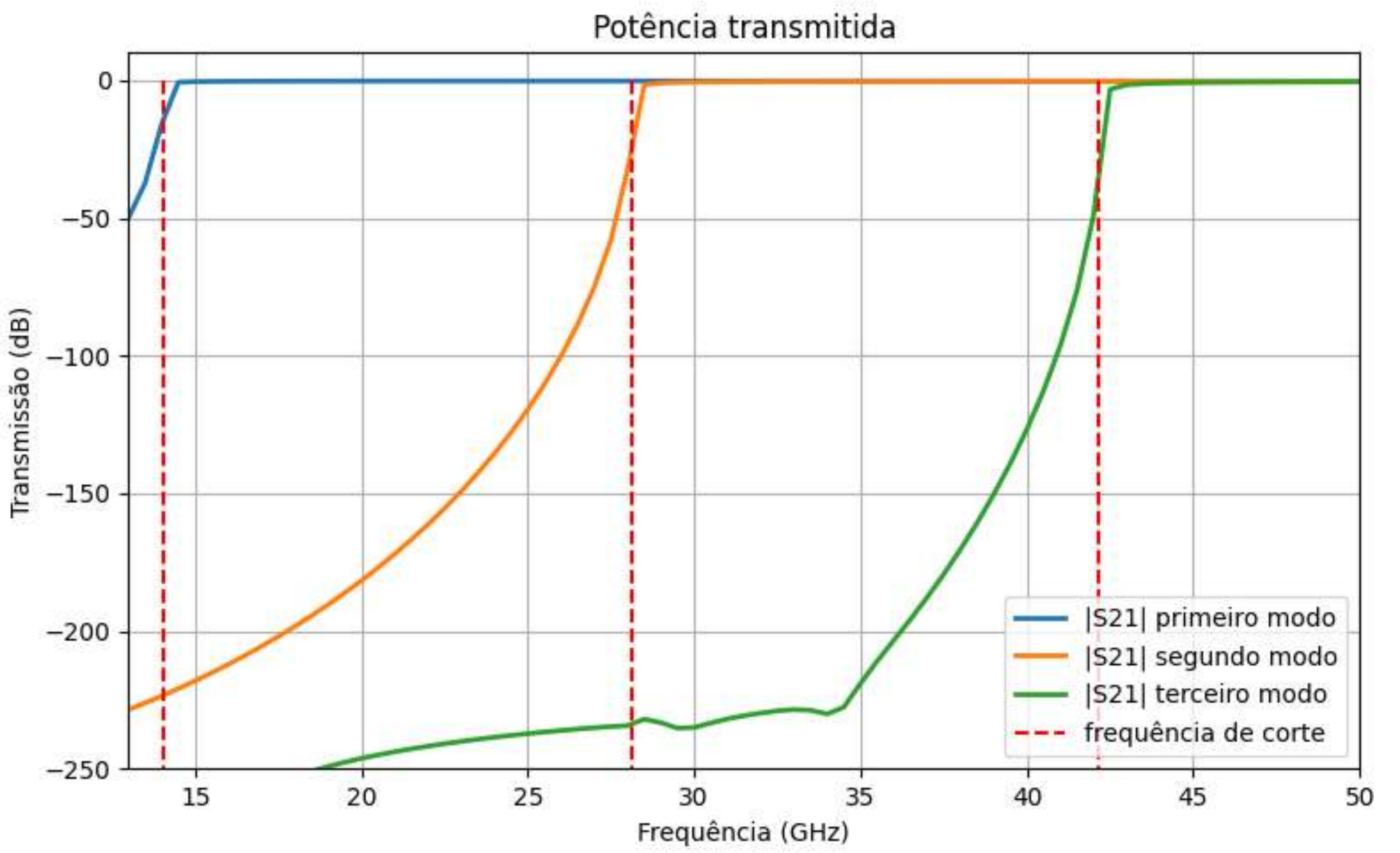

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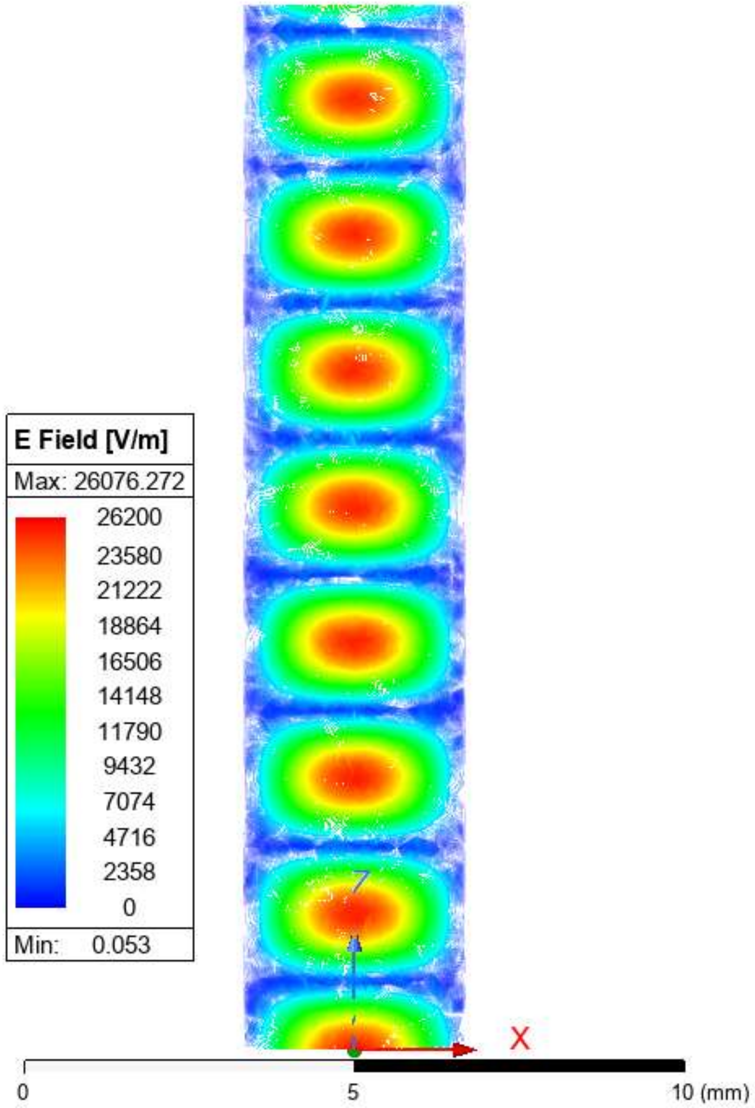
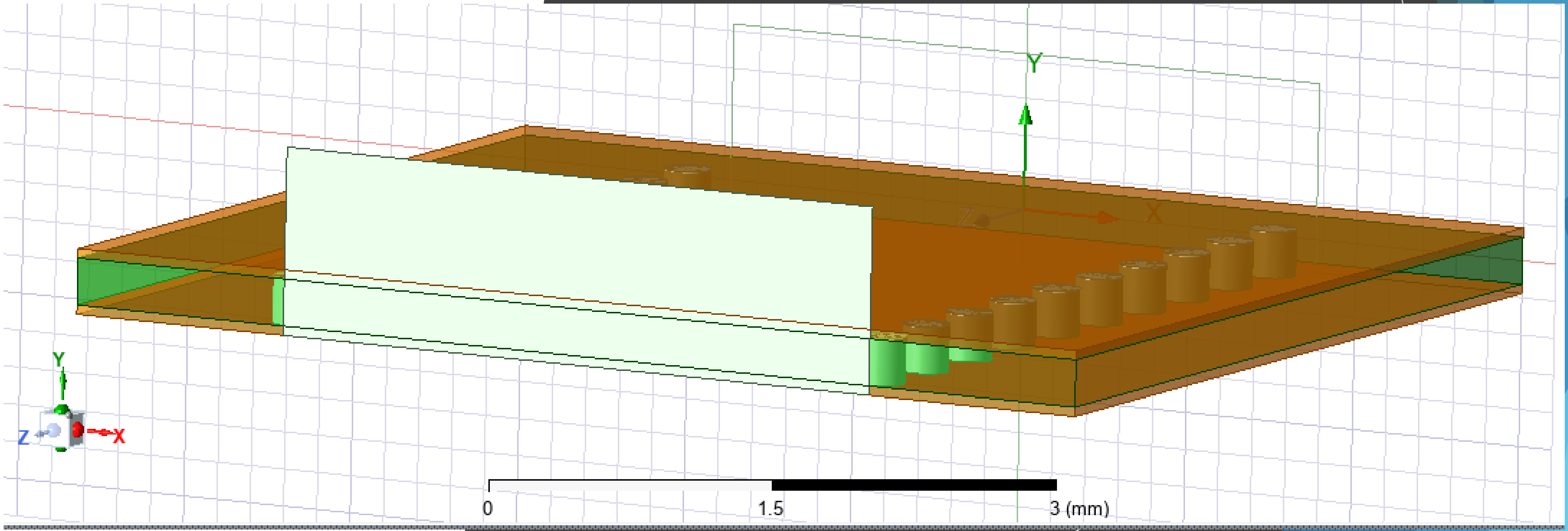
f = 25GHz



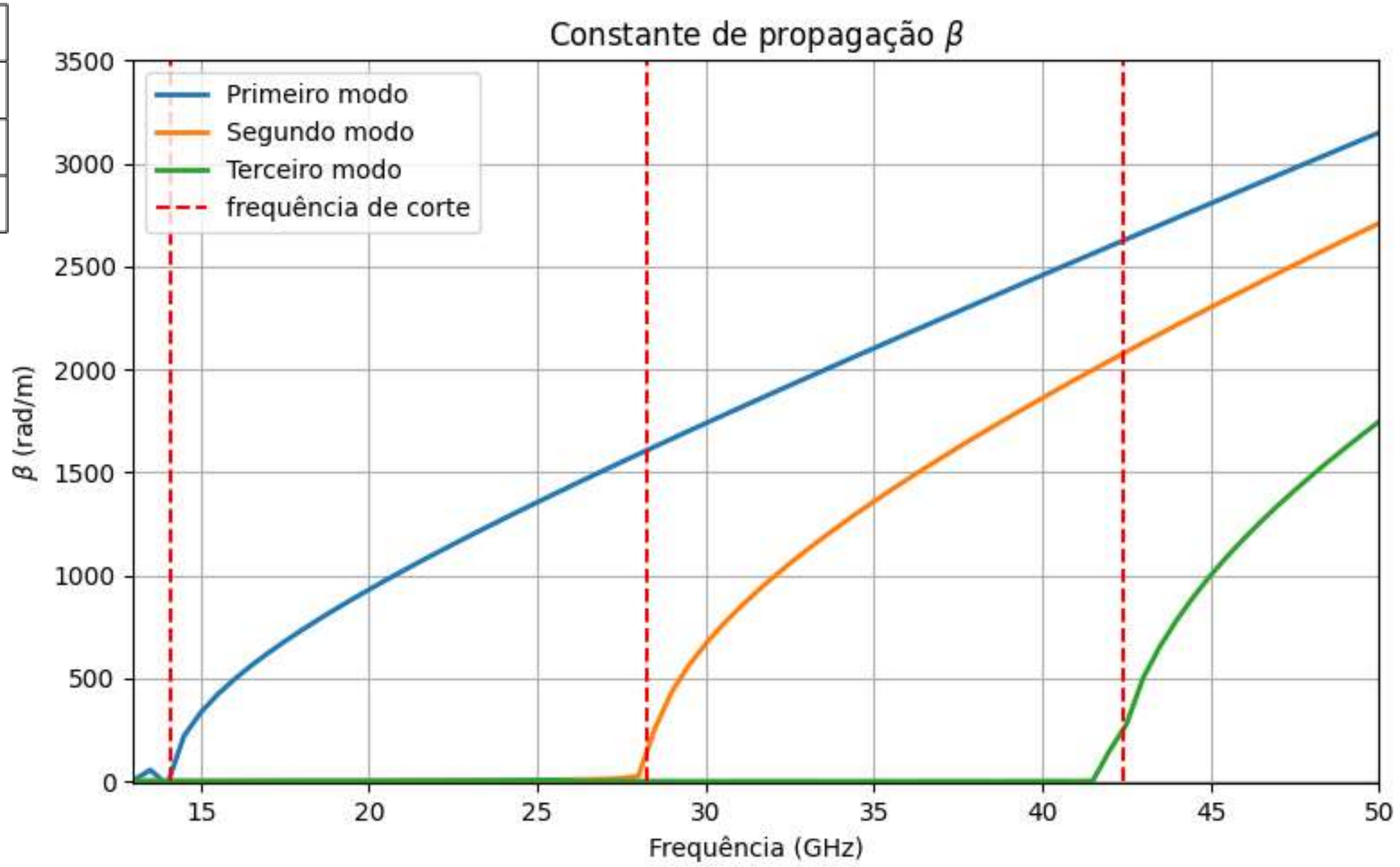
Guia com substrato integrado *SIW*



Guia com substrato integrado

Wsiw = 3.52mm, b = 0.254mm,
L =5.5mm, ϵr = 9.9 e μr = 1

m	n	$f_c(GHz)$
1	0	14.08
2	0	28.16
3	0	42.23



Guia com substrato integrado

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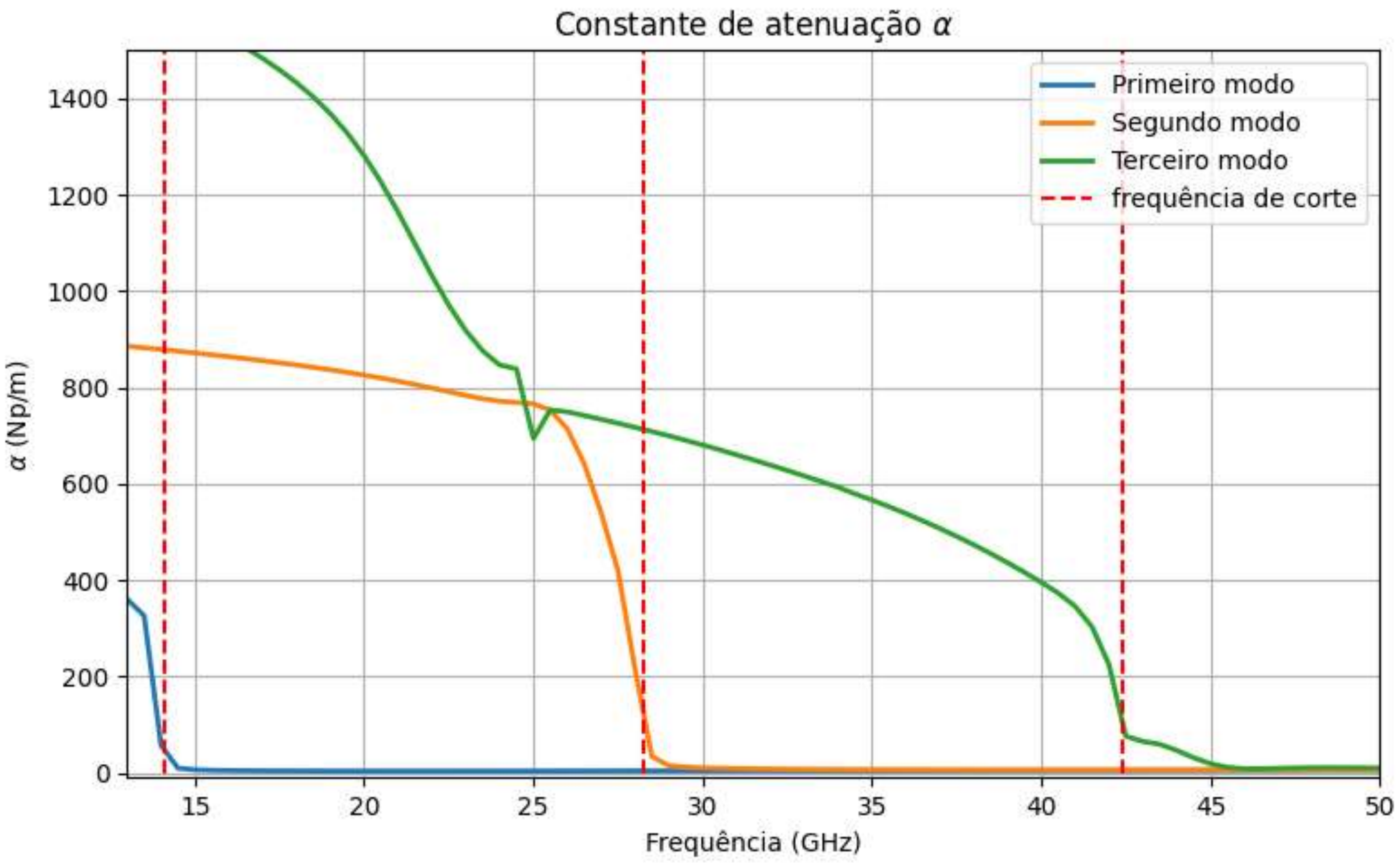
3	0	42.23



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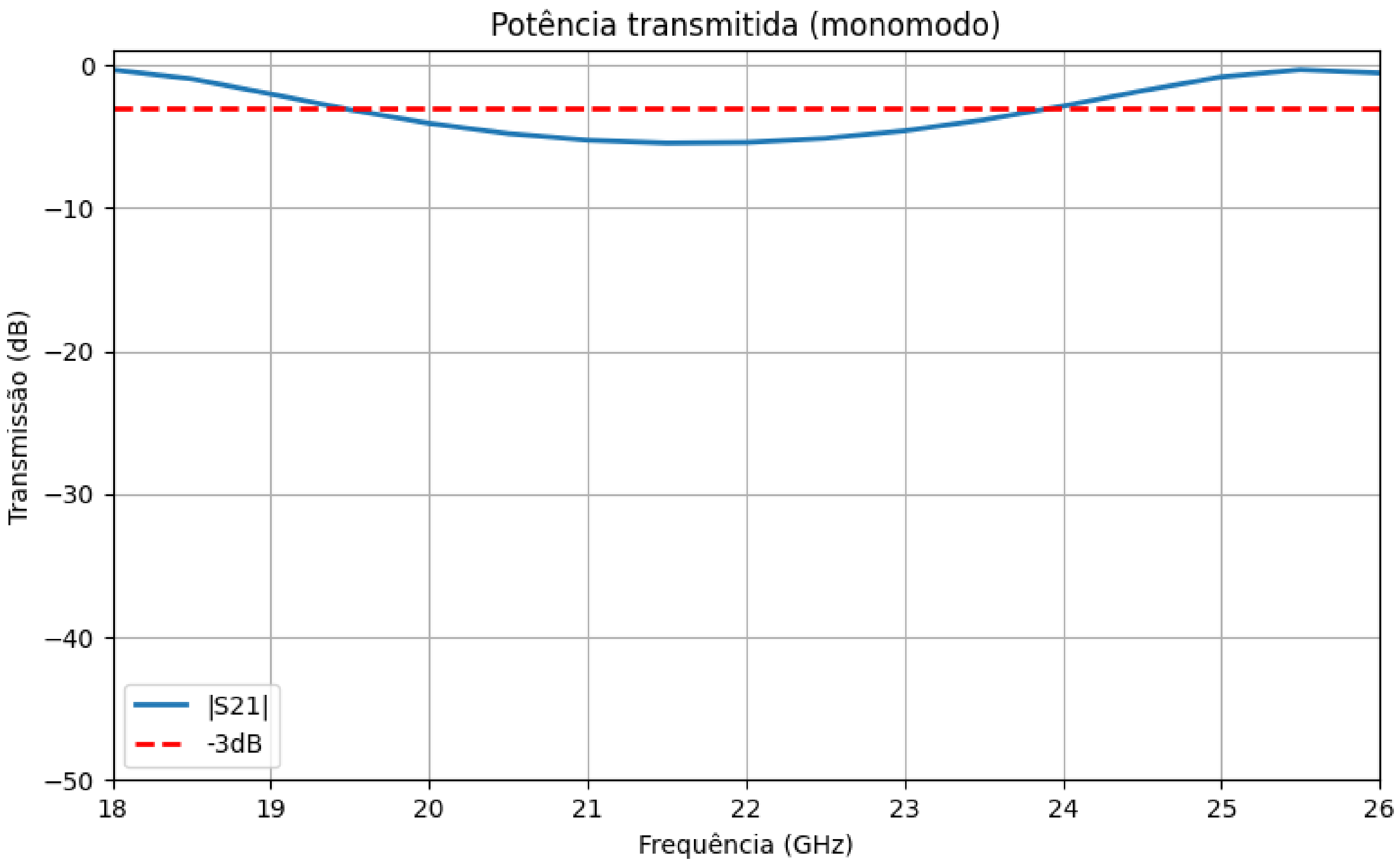

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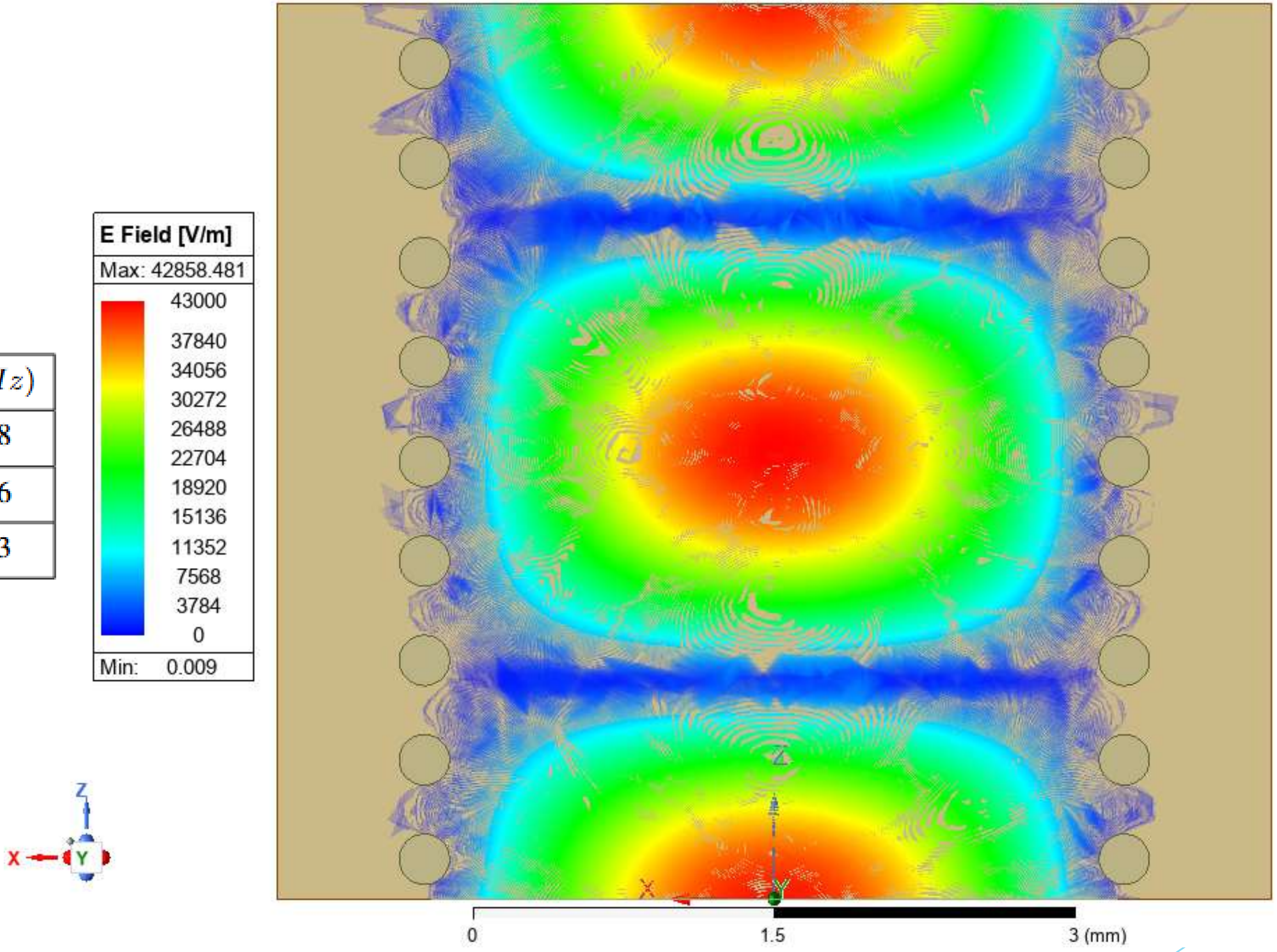
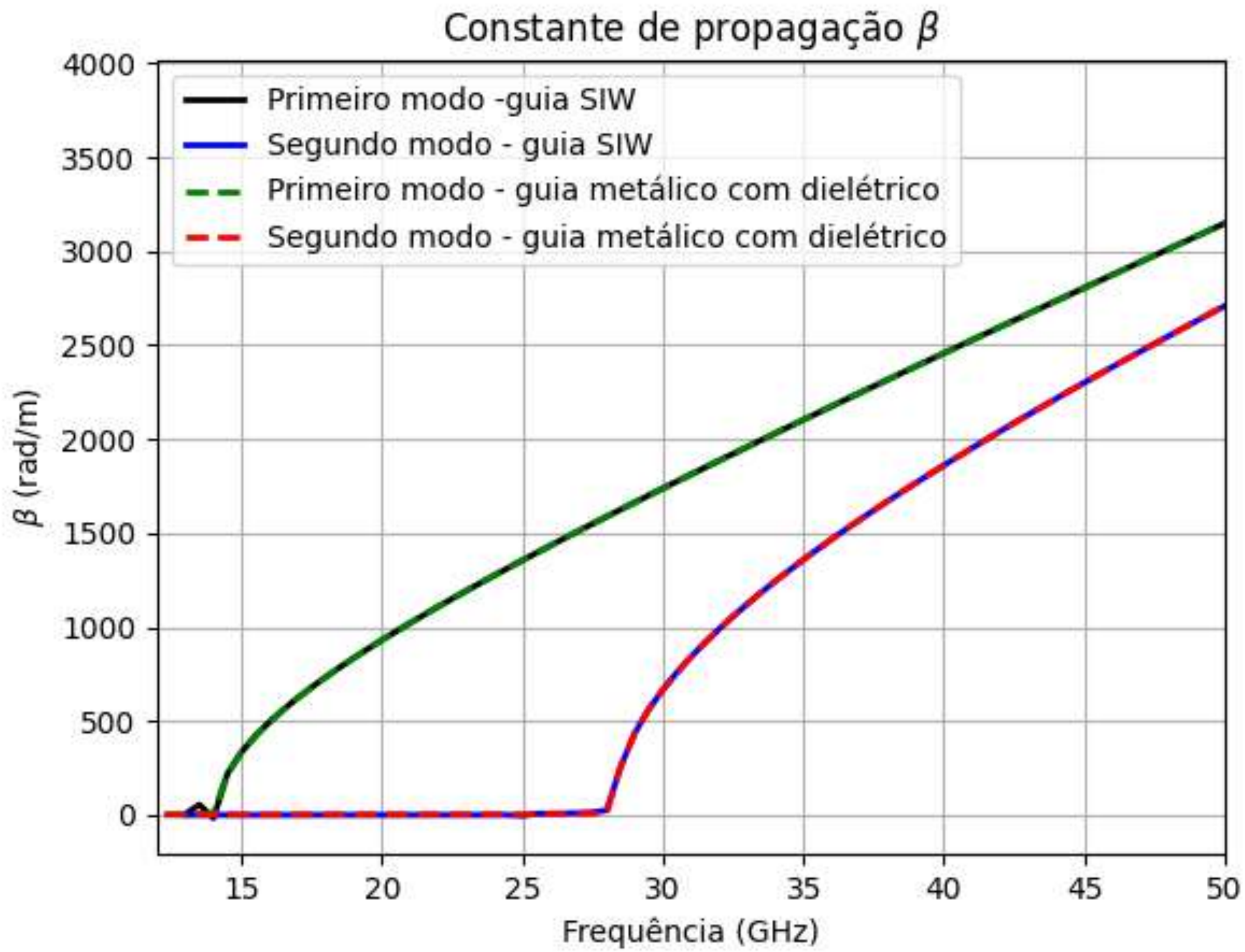


Comparação – metálico com dielétrico e *SIW*



Conclusão

- Validação da teoria;
- Compreensão dos parâmetros modais;
- Importância da metodologia;
- Compreensão dos modos refinada através de recursos computacionais.

Referências

[1] M. Bozzi, A. Georgiadis, and K. Wu. Review of substrate-integrated waveguide circuits and antennas. IET Microwaves, Antennas & Propagation, 5(8):909–920, 2011. Special Issue on RF/Microwave Communication Subsystems for Emerging Wireless Technologies. Received: 15 Sep 2010, Revised: 6 Dec 2010.

[2] Bouchra Rahali, Mohammed Feham, and Junwu Tao. Design of ka-band substrate integrated waveguide bend, power divider and circulator. International Journal of Innovative Technology and Exploring Engineering (IJITEE), 5(7):44, December 2015. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). Retrieval Number: G2242125715/15©BEIESP.