

Propagation Constant

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Electro-Magnetic Waves and Propagation

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Electromagnetic waves Propagation in a sinusoidal manner. The proportion of progress in its playfulness and stage per unit separation is known as the Propagation constant.

(Image will be Updated soon)

Propagation Constant Equation

The Propagation steady of a mode in a waveguide (for example a fibre), frequently meant with the image γ , decides how the playfulness and period of that light with a given recurrence fluctuates along the engendering bearing z :

where $A(z)$ is the perplexing playfulness of the light field at position z .

In lossless media, γ is absolutely nonexistent; we have $\gamma = i\beta$ with the (genuine) stage constant β , which is the result of the powerful refractive file and the vacuum wavenumber. Optical misfortunes (or addition) suggest that γ additionally has a genuine part. Propagation steady relies upon the optical recurrence (or frequency) of the light. recurrence reliance of its fanciful part decides the gathering delay and the chromatic scattering of the waveguide.

Let's Chat!

Note that various meanings of the engendering steady happen in the writing. For instance, the Propagation constant is here and there comprehended to be just the fanciful piece of the amount characterised above, i.e., β . It is then additionally regular to present a standardised Propagation steady which can just change somewhere in the range of 0 and 1. Here, the worth zero relates to the wavenumber in the cladding and 1 to that in the centre.

Transmission Line Equation Derivation

For some random framework, the Propagation steady can be numerically communicated as-

Propagation Constant(γ)=Complex amplitude at the source of the wave (A_0)/Complex sufficiency at separation x (A_x)

$$A_0/A_x = e^{\gamma x}$$

The intricate element can be composed as $\gamma = \alpha + i\beta$ Where,

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The condition is sinusoidal in nature. Here stage changes as per θ though, the abundancy stays invariant as $||e^{i\theta}|| = \cos^2\theta + \sin^2\theta = \sqrt{1}$

The edges are estimated in radian.

Constant Propagation Definition

Electromagnetic waves Propagation in a sinusoidal manner. The proportion of progress in its playfulness and stage per unit separation is known as the engendering steady. Signified by the Greek letter γ . The wordings like Transmission work, Transmission constant, Transmission boundary, Propagation coefficient, Propagation boundary are equivalent to this amount. At times α and β allude all things considered as Propagation boundaries or Transmission boundaries.

Propagation Constant of a Transmission Line

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Propagation steady is a proportion of changes in a sinusoidal electromagnetic wave as far as adequacy and stage while proliferating through a medium. This can be a transmission line or free space. The Propagation constant is a dimensionless amount. It is spoken to by the accompanying equation:

α = Attenuation steady, it makes the sign adequacy decline while proliferating through a transmission line. It is constantly a positive number, on the off chance that we get a negative weakening steady that implies we are damaging the principal law of thermodynamics. Its Unit is dB/metre.

β = Phase constant, it is the nonexistent segment of the Propagation steady. It gives us the period of the sign along a transmission line, at a steady time. Its unit is radians/metre; however, we frequently convert it to degrees/metre.

(Image will be Updated soon)

The expression "engendering constant" is to some degree a misnomer as it, for the most part, fluctuates unequivocally with ω . It is presumably the most generally utilised term however there is a huge assortment of elective names utilised by different creators for this amount. These incorporate transmission boundary, transmission work, engendering boundary, Propagation coefficient and transmission steady. On the off chance that the plural is utilised, it recommends that α and β are being referenced independently yet on the whole as in transmission boundaries, Propagation boundaries, and so on. In the transmission line hypothesis, α and β are considered as a part of the "auxiliary coefficients", the term optional being used to differentiate the essential line coefficients. The essential coefficients are the physical properties of the line, in particular R, C, L and G, from which the optional coefficients might be inferred utilising the telegrapher's condition. Note that in the field of transmission lines, the term transmission coefficient has an alternate significance in spite of the likeness of name: it is the buddy of the reflection coefficient.

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