Rician fading

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Rician fading is a stochastic model for radio propagation anomaly caused by partial cancellation of a radio signal by itself — the signal arrives at the receiver by several different paths (hence exhibiting multipath interference), and at least one of the paths is changing (lengthening or shortening). Rician fading occurs when one of the paths, typically a line of sight signal, is much stronger than the others. In Rician fading, the amplitude gain is characterized by a Rician distribution.

Rayleigh fading is the specialised model for stochastic fading when there is no line of sight signal, and is sometimes considered as a special case of the more generalised concept of Rician fading. In Rayleigh fading, the amplitude gain is characterized by a Rayleigh distribution.

Channel characterization [edit]

A Rician fading channel can be described by two parameters: K and Ω.[1] K is the ratio between the power in the direct path and the power in the other, scattered, paths.[2] Ω is the total power from both paths ($\Omega = \nu^2 + 2\sigma^2$), and acts as a scaling factor to the distribution.

The received signal amplitude (*not* the received signal power) R is then Rice distributed with parameters $\nu^2 = \frac{K}{1+K}\Omega$ and $\sigma^2 = \frac{\Omega}{2(1+K)}$.[3] The resulting PDF then is:

$$f(x) = \frac{2(K+1)x}{\Omega} \exp\left(-K - \frac{(K+1)x^2}{\Omega}\right) I_0\left(2\sqrt{\frac{K(K+1)}{\Omega}}x\right),$$

where $I_0(\cdot)$ is the 0th order modified Bessel function of the first kind.

See also [edit]

- Fading
- Multipath propagation
- Diversity schemes
- Rayleigh fading
- Rice distribution
- Stochastics
- Statistics

References [edit]

1. ^ Abdi, A. and Tepedelenlioglu, C. and Kaveh, M. and Giannakis, G., "On the estimation of the K parameter for the Rice fading distribution ", *IEEE Communications Letters*, March 2001, p. 92 - 94
2. ^ "Statistical properties of a sine wave plus random noise" SO Rice - *Bell Syst. Tech. J*, 1948
3. ^ Richards, M.A., Rice Distribution for RCS, Georgia Institute of Technology (Sep 2006)

- Lindsey, W. "Error probabilities for Rician fading multichannel reception of binary and N-ary signals ", *IEEE Transactions on Information Theory*, Volume 10, Number 4, October 1964, Pages 339–350.
- Rician Fading explained on wirelesscommunication.nl .

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