

应用

莱斯多径衰落信道下OFDM系统的容量方差分析

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摘要:

方差是系统容量的一个重要参数, 可以用来估计通信系统的中断容量。该文研究了正交频分复用 (OFDM) 系统在莱斯衰落信道下的容量方差。首先该文建立了多径莱斯信道的模型并且定义了多径莱斯信道的莱斯因子, 基于此信道模型推出了一个OFDM系统容量方差新的数学表达式, 此表达式以OFDM系统的子载波数、信噪比、信道的多径时延等为参数。基于此表达式, 计算机仿真和数值计算研究了信噪比、多径数目、莱斯因子对OFDM系统容量方差的影响。结果表明: 计算机仿真和数值计算基本吻合, 验证了所推导数学表达式的正确性; 系统容量方差与信噪比成正比, 与莱斯因子和信道的多径数目成反比。另外, 该文以积分的形式给出了任意两个相关莱斯随机变量的联合概率密度函数。

关键词: 正交频分复用; 容量; 方差; 莱斯信道

Capacity variance of OFDM systems over multipath Ricean fading channels

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Abstract:

Capacity variance is an important parameter in the study of system capacity and it can be used to estimate the outage capacity of communication systems. The variance OFDM system capacity over Ricean fading channels is thoroughly investigated. We firstly construct the model of multipath Ricean fading channel and define Ricean factor for multipath fading channel. Based on the channel model, a novel mathematical expression for the capacity variance, as the function of the number of the subcarriers of an OFDM symbol, the signal to noise ratio (SNR) and the power profile of the channel, for Ricean fading channels has been derived. The resultant system capacity variances over Ricean fading channels has also been evaluated by computer simulation and verified by numerical method. Results show that the capacity variance is proportional to SNR and inverse proportional to Ricean factor and the number of paths of the channel. In addition, the joint probability density function (PDF) of two arbitrary correlated Ricean random variables has been provided in an integral form.

Keywords: OFDM capacity variance; Ricean channel

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