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短文与研究通讯

噪声功率时变的瑞利慢衰落信道有限状态Markov模型

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摘要：

对衰落信道的准确建模对于自适应无线通信、认知无线电等应用中的信道预测具有重要意义。针对噪声功率存在时变特性的无线通信应用环境，提出了一种新的瑞利衰落信道的有限状态Markov模型。通过将接收信号的衰落电平进行离散化处理，建立了衰落电平区间与Markov模型状态之间的一一对应关系，推导了门限电平与状态转移概率和状态分布概率之间的理论关系式，并在此基础上提出了一种易于实现的基于等概率的信道模型。理论分析与仿真结果表明：在噪声功率时变的条件下，已有的基于信噪比的模型失效，而该模型能准确反映信道的衰落特性，最大相对误差小于7%。

关键词： 信道建模；瑞利衰落；马尔可夫模型 时变

Finite State Markov Model of Rayleigh Fading Channels with Time-varying Noise Power

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Abstract:

The model of fading channel is very important for channel prediction, which appears in many modern wireless communication systems, such as adaptive wireless communication, cognitive radio and so on. In order to adapt to the application of wireless communication, in which there power of the noise is time-varying, a novel finite-state Markov model (FSMM) representing Rayleigh fading channels was proposed. The range of the received signal amplitude is partitioned into a finite number of intervals, which are associated with the states of the Markov model. The relationship between the amplitude thresholds, the states transition probabilities and the distribution probabilities of the states are derived in theory. An equal-probability channel model, which is realized easily, is proposed. The theoretical analysis and the Monte Carlo simulation results illustrate that the model based on signal-noise-rate is invalid when the power of the noise is time-varying, while the model proposed in this paper fits with the Rayleigh fading channel very well.

Keywords: channel modeling Rayleigh fading Markov model, time-varying

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