

论文

## 平坦衰落环境中多输入多输出系统衰落相关与信道容量研究

王 君, 朱世华, 王 磊

西安交通大学电子与信息工程学院 西安 710049

收稿日期 2004-11-1 修回日期 2005-6-21 网络版发布日期 2007-12-21 接受日期

摘要

为分析模型物理参数和天线排列方式对多输入多输出系统信道容量的影响, 提出了一种平坦衰落环境中信道容量的研究方法。该方法基于接收均匀圆阵和均匀线阵分别构建了蕴含模型物理参数的相关矩阵, 并利用Wishart分布的性质推导了信道容量上下限。该方法回避了求取衰落相关矩阵特征值的概率密度函数, 降低了运算量; 可被推广到多天线-频分复用系统。仿真结果表明, 天线间距较小时, 采用均匀圆阵比均匀线阵的系统信道容量要高; 天线间距增大到一定程度后, 系统信道容量达到饱和。散射角越大, 信道容量的增长速率越快且采用均匀线阵比均匀圆阵系统的信道容量高。接收信噪比较大时, 平均信道容量上下限基本接近其实际值。

关键词 [移动通信](#) [多输入多输出](#) [信道容量](#) [衰落相关](#)

分类号 [TN929.533](#)

## On Fading Correlation and Channel Capacity of MIMO Systems under Flat Fading

Wang Jun, Zhu Shi-hua, Wang Lei

School of Electronics and Information Engineering, Xi'an Jiaotong University, Xi'an 710049, China

Abstract

In order to study the impacts of array configuration and channel model parameters including antenna spacing and scattering angle on the channel capacity of a MIMO (Multiple Input Multiple Output) system, a novel method is proposed to explore the channel capacity under flat fading. Fading correlation matrix is constructed based on uniform circular antenna and uniform linear antenna at the receiver side, respectively. And then using the properties of Wishart distribution, closed-form expressions for the upper and lower bounds on the ergodic capacity of  $N$  by  $MM$ IMO system are presented in detail. The problem of calculating the probability density function of eigenvalues of the fading channel matrix is avoided and the computational complexity is lower in contrast to the previous methods. The novel method also could be generalized to MIMO-OFDM systems with any number of transmit and receive antennas. Computer simulation results show that for small spacing the UCA yields higher channel capacity than ULA. The channel capacity is maximized when the antenna spacing increases to a certain point, and further more, the larger the scattering angle, the quicker the channel capacity converges to its maximum. And at high SNR, the upper and lower bounds on the ergodic capacity are close to its true value.

Key words [Mobile communication](#) [Multiple Input Multiple Output \(MIMO\)](#) [Channel capacity](#) [Fading correlations](#)

DOI :

通讯作者

作者个人主页 王 君; 朱世华; 王 磊

扩展功能
本文信息
▶ <a href="#">Supporting info</a>
▶ <a href="#">PDF (360KB)</a>
▶ <a href="#">[HTML全文](OKB)</a>
▶ <a href="#">参考文献[PDF]</a>
▶ <a href="#">参考文献</a>
服务与反馈
▶ <a href="#">把本文推荐给朋友</a>
▶ <a href="#">加入我的书架</a>
▶ <a href="#">加入引用管理器</a>
▶ <a href="#">复制索引</a>
▶ <a href="#">Email Alert</a>
▶ <a href="#">文章反馈</a>
▶ <a href="#">浏览反馈信息</a>
相关信息
▶ <a href="#">本刊中 包含“移动通信”的 相关文章</a>
▶ 本文作者相关文章
· <a href="#">王 君</a>
· <a href="#">朱世华</a>
· <a href="#">王 磊</a>