

相角雜訊於MC-CDMA系統效能衝擊之研究

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摘要

本論文旨在研究多蜂巢MC-CDMA蜂巢式系統結合多輸入多輸出(multiple input multiple output, MIMO)系統，之結合最大比例(maximum ratio combining, MRC)合成方式，工作於相關衰落通道上，之受到相位雜訊影響時之容量效能分析。在本文中獲得一個含有一般式的容量效能分析式，和MC-CDMA系統平均位元錯誤率(bit error rate, BER)，而且具任意相關係數之分集結合器之新聯合機率密度函數的封閉形式方程式。結果證明MC-CDMA容量效能，取決於衰落通道相關接收與發射之振盪相位差CPN特性，而且其受到分支的內分支影響十分明顯。

關鍵詞：最大比例、多輸入多輸出、相關衰落通道、MC-CDMA系統、振盪相位差

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參考文獻

- [1] R. Price and P. E. Green, "A Communication Technique for Multipath Channels", Proceeding of the IRE, Vol. 46, pp. 555-570, 1958.
- [2] P. Lombardo et al., "MRC Performance for Binary Signals in Nakagami Fading with General Branch Correlation", IEEE Trans. on Commun., Vol. 47, No. 1, pp. 44-52, 1999.
- [3] B. Natarajan et. al., "Generation of correlated Rayleigh Fading Envelope for Spread Spectrum Applications", IEEE Commun. Letters, Vol. 4, No. 1, pp. 9-11, 2000.
- [4] M. Nakagami, The m-distribution-A General Formula of Intensity Ddistribution of Rapid Fading, in Statistical Methods in Radio Wave Propagation. Oxford, U.K.: Permagon, pp. 3-36, 1960.
- [5] V. A. Aalo, "Performance of Maximal-ratio Diversity Systems in a Correlated Nakagami-fading Environment", IEEE Trans. on Commun., Vol. 43, pp. 2360-2369, 1995.
- [6] Q. T. Zhang, "Maximal-ratio Combining over Nakagami Fading Channels with an Arbitrary Branch Covariance Matrix", IEEE Trans. on Vehic. Technol., Vol. 48, No. 4, pp. 1142-1149, 1999.
- [7] F. Patenaude, J. H. Lodge, and J. Chouinard, "Noncoherent diversity reception over Nakagami-fading channels", IEEE Trans. on Commun., Vol. 46, No. 8, pp. 985-991, 1998.
- [8] N. H. L. Chan and P. T. Mathiopoulos, "Efficient Video Transmission over Correlated Nakagami Fading Channels for IS-95 CDMA Systems", IEEE J. select. Area Commun., Vol. 18, No. 6, pp. 996-1011, 2000.
- [9] Emad K. Al-Hussaini and Iman M. Sayed, "Selection and MRC Diversity for a DS/CDMA Mobile Radio System through Nakagami Fading

Channel ” , Wireless Personal Communications, Vol. 16, pp. 115-133, 2001.

[10] Yawpo Yang, Joy I. Z. Chen, and J. C. Liu, “ Performance Analysis of DS-CDMA System over Correlated Nakagami Fading Channel ” , J. Chung Cheng Inst. of Technol., Vol. 30, No. 1, pp. 143-158, 2001.

[11] Q. T. Zhang, “ A Generic Correlated Nakagami Fading Model for Wireless Communications ” , IEEE Trans. on Commun., Vol. 51, no. 11, pp. 1745-1748, 2003.

[12] N. Eng and L. B. Milstein, “ Coherent DS-CDMA Performance in Nakagami Multipath Fading ” , IEEE Trans. on Commun., Com-43, pp. 1134-1143, 1995.

[13] W. C. Y. Lee, “ Effect of Correlation Between Two Mobile Radio Base-station Antennas ” , IEEE Trans. on Commun. Com-21, pp. 1214-1224, 1973.

[14] M. S. Alouini and A. Goldsmith, “ A Unified Approach for Calculating the Error Rates of Linearly Modulated Signals over Generalized Fading Channels ” , Proc. IEEE Int. Conf. Commun. ICC ' 98, Atlanta, GA, pp. 459-464, 1998.

[15] A. S. Krishnamoorthy and M. Parthasarathy, “ A Multivariate Gamma-type Distribution ” , Annals Math. Statist., Vol. 22, pp. 549-557, 1951.

[16] H. Buchholz, The Confluent Hypergeometric Function, Springer-verlag Berlin Heidelberg N. Y., Chapter IV, pp. 90-132, 1969.

[17] M. H. Fong, V. K. Bhargava, and Q. Wang, “ Concatenated Orthogonal/PN Spreading Sequences and Their Application to a Cellular DS-CDMA System with Integrated Traffic ” , IEEE J. Select. Areas Commun., Vol. 14, No. 3, pp. 547-558, 1996.