

在多載波分碼多工通訊系統中設計適應性盲蔽式接收機

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摘要

在本篇論文，我們在下鏈多載波分碼多工系統中設計盲蔽式適應性行動接收機(不須要training sequences和其他用戶的展頻碼)。我們推導出batch-mode minimum-output-energy (MOE)接收機的架構，再利用此架構發展出盲蔽式適應性接收機。此外，盲蔽式通道估計藉由選擇適當的限制條件，使得目標使用者的訊號沒有被消除。我們根據接收機最小的輸出功率使其最大化的方式來完成盲蔽式適應性通道估計。而通道估計的參數是為了決定行動接收機的權重向量。我們根據recursive-least-squares (RLS) generalized-sidelobe-canceller (GSC)，以及gradient search演算法，來設計盲蔽式適應性MOE接收機以及盲蔽式通道估計。模擬結果顯示出盲蔽式適應性接收機的效能收斂至接近於理想的batch-mode MOE接收機。另外也證明出能有效抵抗near-far的問題。

關鍵詞：多載波分碼多工；盲蔽式；適應性

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參考文獻

- [1] R. Prasad, OFDM for Wireless Multimedia Communications, Chapter8, Artech House Publishers, 2000
- [2] N. Yee, J-P. Linnartz and G. Fettweis, " Multicarrier CDMA in indoor wireless radio networks " Proc. of IEEE PIMRC ' 93, Yokohama, Japan, Sept. 1993, pp. 109-113.
- [3] S. Kondo and L. B. Milstein, " Performance of multicarrier DS-SS systems " IEEE Trans. Communications, vol. 44, no.2, pp. 238-246, Feb. 1996.
- [4] V. M. DaSilva and E. S. Sousa, " Performance of orthogonal CDMA codes for quasi-synchronous communication systems " Proc. of IEEE ICUPC ' 93, Ottawa, Canada, Oct. 1993, pp. 995-999.
- [5] T. S. Rappaport, Wireless Communications: Principles and Practice, Prentice Hall, Upper Saddle River, NJ, 1996.
- [6] M. L. Honig, U. Madhow, and S. Verdu, " Blind adaptive multiuser detection " IEEE Trans. on Information Theory, vol. 41, no. 4, pp. 944-996, July 1995
- [7] H. L. Van Tree, Optimum Array Processing, John Wiley & Sons, Inc., 2002.
- [8] Simon Haykin, Adaptive Filter Theory, 4th edition Prentice-Hall, Inc. 2002.
- [9] S. Hara and R. Prasad, " Design and performance of multicarrier CDMA system in frequency-selective Rayleigh fading channels " IEEE

Trans. Veh. Technol., vol. 48, pp. 1584-1594, Sept. 1999.

[10] John R. Treichler, C. Richard Johnson, JR. Michael G. Larimore, Theory and Design of Adaptive Filters. Prentice-Hall, Inc. 2001.

[11] Andrew J. Viterbi, "CDMA principles of spread spectrum communication," Addison Wesley, 1995 [12] Olufumilola Awoniyi,

"multicarrier modulation code division multiple access," wireless communication class project, Stanford University [13] N. Yee, J.-P. Linnartz, and G. Fettweis, "Multi-carrier CDMA in indoor wireless radio networks," in Proc. IEEE PIMRC '93, Sept. 1993, pp. 109 – 113.

[14] K. Fazel and L. Papke, "On the performance of convolutionally-coded CDMA/OFDM for mobile communication system," in Proc. IEEE PIMRC '93, Sept. 1993, pp. 468 – 472.

[15] A. Chouly, A. Brajal, and S. Jourdan, "Orthogonal multicarrier techniques applied to direct sequence spread spectrum CDMA systems," in Proc. IEEE GLOBECOM '93, Nov. 1993, pp. 1723 – 1728.

[16] B. Sklar, Digital communications : fundamentals and applications, 2th ed , Chapter15, Prentice-Hall International, inc. 2001.

[17] H. Bogucka, "Transmission and reception of the multicarrier CDMA signals in the 3rd generation mobile communication system " ICPWC '96, pp. 319-322.

[18] H. Liu, Signal Processing Applications in CDMA Communications, Chapter 5, Artech House Publishers, 2000.

[19] L. Hanzo, M. Munster, B.J. Choi and T. Keller , OFDM and MC-CDMA for broadband multi-user communications, Wlans and broadcasting, Chapter8, IEEE Press, 2003 [20] L. Hanzo , L-L. Yang , E-L. Kuan and K. Yen , Single and Multi-carrier DS-CDMA, Chapter19,

John Wiley & Sons, Inc. 2003.

[21] S.K. Mitra , Digital Signal Processing , 3th ed , Chapter3, Mc.GRAW.Hill, 2006 [22] Shinsuke Hara, Ramjee Prasad, " Design and

Performance of Multicarrier CDMA System in Frequency-Selective Rayleigh Fading Channel, " IEEE Transactions on Vehicular Technology,

[23] Zhiqiang Wu, Carl R. Nassar and Suihua Lu, " Maximum Likelihood Combining for MC-CDMA, " IEEE Vehicular Technology

Conference (VTC2002), pp. 1293-1297, May , 2002