

Antenna selection in rank-deficient MIMO systems

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Abstract: In a rank-deficient $M \times N$ MIMO system, the number of non-zero eigen-modes is smaller than $\min(M, N)$. In such a system, it is desirable to be able to identify then eliminate the most 'inactive' antennas or equivalently to select the most 'active' antennas for operation. In this paper we use the incremental algorithm for the successive selection technique for receive antenna selection applied to a rank-deficient indoor MIMO link transmitting through a small window between two rooms. It is shown that there is a close correspondence between the rank of the ill-conditioned MIMO channel and the minimum number of receive antennas that can be selected for a given small reduction in capacity. ?? 2008 IEEE.

Author Keywords: Antenna selection; Diversity combining.; MIMO; Rank deficiency

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References:

1. Foschini, G.O.G.J., Layered space-time architecture for wireless communication in a fading environment when using multi-element antennas (1996) Bell Lab. Tech. J, pp. 41-59. , Autumn
2. Verdu, S., Spectral Efficiency in the Wideband Regime (2002) IEEE Transactions on Information Theory, 48 (6), pp. 1319-1343. , June
3. Chizikh, D., Keyholes, correlations, and capacities of multielement transmit and receive antennas (2002) IEEE Trans. Wireless Commun, 1, pp. 361-368. , Apr
4. Almers, P., Measurement of Keyhole Effect in a Wireless Multiple-Input Multiple-Output (MIMO) Channel (2003) IEEE Communication Letters, 7 (8), pp. 373-375. , August
5. Gesbert, D., Outdoor MIMO Wireless Channels: Models and Performance Prediction (2002) IEEE Transactions on Communications, 50 (12), pp. 1926-1934. , Dec
6. Vu, V., Dinh Thong, N., Rank Deficiency in Indoor MIMO (2007) Proc.Int. Conf IEEE Region 10, TENCON'07, , November, Taiwan
7. Win, M., Winters, J., Virtual branch analysis of symbol error probability for hybrid selection/maximal-ratio combining in Rayleigh fading (2001) IEEE Trans. Commun, 49, pp. 1926-1934. , Nov
8. Molisch, A.F., Win, M.Z., Winters, J.H., Capacity of MIMO Systems with Antenna Selection Proc. IEEE Int. Conf. Commun, pp. 570-574. , Helsinki, Finland, June 2001, pp
9. Gorokhov, A., Antenna selection algorithms for MEA transmission systems (2002) Proc. IEEE ICASSP, 3, pp. 2857-2860. , Orlando, FL, May
10. Gore, D.A., Nabar, R.U., Paulraj, A., Selecting an optimal set of transmit antennas for a lowrank matrix channel (2000) Proc. IEEE ICASSP, 5, pp. 2785-2788. , Istanbul, Turkey, May
11. Gorokhov, A., Receive Antenna Selection for MIMO Spatial Multiplexing: Theory and Algorithms (2003) IEEE Trans. Sig. Proc, 51 (11), pp. 2796-2807. , Nov
12. Gharavi-Alkhansari, M., Greshman, A., Fast Antenna Selection in MIMO Systems (2004) IEEE Trans. Sig. Proc, 52 (2), pp. 339-347. , Feb
13. Bahceci, I., Duman, T.M., Altunbasak, Y., Antenna Selection for Multiple-Antenna Transmission Systems: Performance Analysis and Code Construction (2003) IEEE Trans. info. Theory, 49 (10), p. 2669-81. , Oct
14. Sanayei, S., Nosratinia, A., Antenna Selection in MIMO Systems (2004) IEEE Communications Magazine, pp. 68-73. , October