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Nota di contenuto	Space-Time Processing for MIMO Communications; Contents; List of Contributors; Preface; Acknowledgements; 1 MIMO Wireless Channel Modeling and Experimental Characterization; 1.1 Introduction; 1.1.1 MIMO system model; 1.1.2 Channel normalization; 1.2 MIMO ChannelMeasurement; 1.2.1 Measurement system; 1.2.2 Channel matrix characteristics; 1.2.3 Multipath estimation; 1.3 MIMO ChannelModels; 1.3.1 Random matrix models; 1.3.2 Geometric discrete scattering models; 1.3.3 Statistical cluster models; 1.3.4 Deterministic ray tracing; 1.4 The Impact of Antennas onMIMO Performance 1.4.1 Spatial diversity1.4.2 Pattern (angle and polarization) diversity; 1.4.3 Mutual coupling and receiver network modeling; References; 2 Multidimensional Harmonic Retrieval with Applications in MIMO Wireless Channel Sounding; 2.1 Introduction; 2.2 Harmonic Retrieval DataModel; 2.2.1 2-D harmonic retrieval model; 2.2.2 N-D harmonic retrieval model; 2.2.3 Khatri-Rao product of Vandermonde matrices; 2.3 Identifiability of Multidimensional Harmonic Retrieval; 2.3.1 Deterministic ID of N-D harmonic retrieval; 2.3.2 Stochastic ID of 2-D harmonic retrieval

2.3.3 Stochastic ID of N-D harmonic retrieval; 2.4 Multidimensional Harmonic Retrieval Algorithms; 2.4.1 2-DMDF; 2.4.2 N-DMDF; 2.4.3 N-D unitary ESPRIT; 2.4.4 N-DMUSIC; 2.4.5 N-D RARE; 2.4.6 Summary; 2.5 Numerical Examples; 2.5.1 2-D harmonic retrieval (simulated data); 2.5.2 3-D harmonic retrieval (simulated data); 2.6 Multidimensional Harmonic Retrieval for MIMO Channel Estimation; 2.6.1 Parametric channel modeling; 2.6.2 MIMO channel sounding; 2.6.3 Examples of 3-D MDF applied to measurement data; 2.7 Concluding Remarks; References

3 Certain Computations Involving Complex Gaussian Matrices with Applications to the Performance Analysis of MIMO Systems; 3.1 Introduction; 3.2 Performance Measures of Multiple Antenna Systems; 3.2.1 Noise-limited MIMO fading channels; 3.2.2 MIMO channels in the presence of cochannel interference; 3.2.3 MIMO beamforming; 3.3 Some Mathematical Preliminaries; 3.4 General Calculations with MIMO Applications; 3.4.1 Main result; 3.4.2 Application to noise-limited MIMO systems; 3.4.3 Applications to MIMO channels in the presence of interference; 3.5 Summary; References

4 Recent Advances in Orthogonal Space-Time Block Coding; 4.1 Introduction; 4.2 Notations and Acronyms; 4.3 Mathematical Preliminaries; 4.4 MIMO System Model and OSTBC Background; 4.5 Constellation Space Invariance and Equivalent Array-Processing-Type MIMO Model; 4.6 Coherent ML Decoding; 4.7 Exact Symbol Error Probability Analysis of Coherent ML Decoder; 4.7.1 Probability of error for a separable input constellation; 4.7.2 Probability of error for a nonseparable input constellation; 4.8 Optimality Properties of OSTBCs; 4.8.1 Sufficient conditions for optimal space-time codes with dimension-constrained constellations

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## Sommario/riassunto

Driven by the desire to boost the quality of service of wireless systems closer to that afforded by wireline systems, space-time processing for multiple-input multiple-output (MIMO) wireless communications research has drawn remarkable interest in recent years. Exciting theoretical advances have been complemented by rapid transition of research results to industry products and services, thus creating a vibrant new area. Space-time processing is a broad area, owing in part to the underlying convergence of information theory, communications and signal processing research that brought it to fru

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