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Efficient One-, Two-, and Multidimensional High-Resolution Array Signal Processing Shaker Verlag Aachen Signal Reconstruction 25 3. Real-Valued.

This is an open access article distributed under the Creative Commons Attribution License , which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. Abstract A low complexity monostatic cross multiple-in multiple-out MIMO radar scheme is proposed in this paper. The minimum-redundancy linear array MRLA is introduced in the cross radar to improve the efficiency of the array elements. The two-dimensional direction-of-arrival DOA estimation problem links to the trilinear model, which automatically pairs the estimated two-dimensional angles, requiring neither eigenvalue decomposition of received signal covariance matrix nor spectral peak searching. The proposed scheme performs better than the uniform linear arrays ULA configuration under the same conditions, and the proposed algorithm has less computational complexity than that of multiple signal classification MUSIC algorithm. Simulation results show the effectiveness of our scheme. Introduction Multiple-in multiple-out MIMO radar is a relative new concept in radar system that received considerable attention [1 , 2]. Unlike the traditional phase-array radar, the transmit antennas of MIMO radar simultaneously transmit orthogonal waveforms and utilise multiple antennas to receive the reflected signals [3]. Angel estimation is a basic problem in MIMO radar that has been investigated in [4 , 5]. Most of the previous studies are based on the uniform arrays for the simple array geometry, such as uniform linear arrays ULA and uniform circular-shape and L-shape arrays. The minimum-redundancy array MRA is an important type of the nonuniform linear geometries, with the sensor placement designed to achieve the maximum resolution for a given number of elements by reducing the redundancy of spatial correlation lags [6]. Studies show that the MRA has better angle resolution and interference suppression than the ULA for a given number of sensors [7]. Due to the capability of spanning larger aperture, a MRA configured colocated MIMO radar is proposed for one dimensional angle estimation in [8], which has achieved desired results. In addition, MUSIC algorithm requires spectral peak searching, which would cause computation disaster in the situation of 2D angle estimation. Another problem that how to pair the estimated parameters arises within the ESPRIT algorithm, which requires the extra computational load, and usually fails to work in lower SNR. Furthermore, the subspace based methods suppose that the number of the sources is known, which is contrary to actual applications. Trilinear decomposition algorithm has been used for detection and localisation of multiple targets in a ULA based MIMO radar system [10 , 11]. However, the trilinear algorithm would be lapsed with the MRA configuration, as the phase ambiguity follows the received array signal, which would confuse the paired angles. The improved trilinear model based blind angle estimation algorithm is developed for the proposed radar scheme. The DOA estimation problem links to the trilinear model. In order to eliminate the phase ambiguity, the estimated phase is adaptively compensated according to the array manifold. With this improvement, the proposed algorithm could be extended for arbitrarily array manifolds. We also analyse the complexity and error characteristics of the algorithm. Simulation results show the effectiveness of the proposed scheme. The rest of the paper is organized as follows. Section 3 specifies the DOA estimation method with trilinear decomposition. Simulation results are given in Section 4. Finally, we provide concluding remarks in Section 5. Lowercase and capital letters in bold denote, respectively, vectors and matrices. The superscripts and represent, respectively, the transpose and Hermitian transpose of a matrix. Without loss of generality, we suppose that -element transmitter and -element receiver are symmetrically located in the -axis and -axis. The phase center of the transmits and receivers is overlapped in the origin, while the physical location of the th transmitter and the th receiver is denoted by and , respectively. It is also assumed that there are noncoherent targets appearing in the far-field of the antennas with the th target at azimuth angle and elevation angle. The transmit antennas transmit orthogonal waveforms with the same carrier frequency, and the transmit waveform of th antenna during.

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Chapter 2 : CiteSeerX â€” Citation Query Efficent One-, Two-, and Multidimensional HighResolution Array

*Efficient one-, two-, and multidimensional high resolution array signal processing (Berichte aus dem Lehrstuhl fur Netzwerktheorie und Schaltungstechnik der Technischen Universitat Munchen) [Martin Haardt] on blog.quintoapp.com *FREE* shipping on qualifying offers.*

Published online Oct Maki Find articles by Jeffrey H. Yarnykh Find articles by Vasily L. Received May 23; Accepted Sep Copyright Wang et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are properly credited. This article has been cited by other articles in PMC. Abstract Background The aim of this study was to explore the feasibility and reproducibility of a time-efficient coronary vessel wall measurement approach using an improved motion-sensitized driven equilibrium iMSDE pulse sequence. The iMSDE sequence was found to provide good coronary vessel wall delineation. It was also found to provide reproducible coronary vessel wall diameter and thickness measurements in both proximal and middle segments of the right coronary artery. Conclusion The feasibility and reproducibility of iMSDE based coronary vessel wall imaging were demonstrated for the first time, paving the way for further testing in a clinical environment for fast and accurate coronary artery disease detection. Introduction Coronary artery disease CAD remains the number one cause of death in the Western world [1] and over half of all patients with sudden cardiac death do not experience typical symptoms such as chest pain prior to the event [2] , [3]. Although the use of these and other risk scores is a major advance over clinical risk predictions based on relative risk estimates, they still remain imperfect for predicting cardiovascular events in individual patients [6]. To overcome this limitation, a lot of effort has been made to detect the presence of subclinical atherosclerotic lesions using imaging approaches, such as computed tomography angiography [7] and intravascular ultrasonography [8]. Magnetic resonance imaging MRI is an attractive alternate for this purpose as it is totally non-invasive, does not require the injection of contrast medium, and is well suited for repetitive imaging in cases where follow-up is desired. Furthermore, with excellent soft tissue contrast, MRI is capable of detecting not only luminal narrowing [9] , but also positive remodeling [10] of the coronary vessel wall CVW [11]. The latter phenomenon has been traditionally regarded as a pivotal sign of clinically relevant future coronary artery disease [12] , and might influence individual treatment decisions. Black-blood MRI techniques, which can suppress hyperintense blood signal for better visualization of the vessel wall, are important for coronary artery vessel wall measurements. This technique, however, is limited in a few aspects when applied for CVW imaging. First, it requires a relatively long inversion time TI , usually â€” ms, to achieve sufficient blood nulling. As a result, imaging of a single coronary artery with this method may take up to 10â€”15 minutes, since a repetition time TR of two heartbeats is required to achieve sufficient blood suppression. Second, due to the long TI time, the optimal TI time usually conflicts with the optimal trigger delay, forcing the adoption of a less optimal imaging protocol. Third, DIR based techniques can achieve only suboptimal blood suppression if the imaging plane is not perpendicular to the flow direction. As a result, when an artery with tortuous segments is imaged, flow artifacts can be observed. Furthermore, as has been shown in carotid artery imaging, the DIR technique is known to suffer from high signal-intensity slow flow artifacts at the boundary between the vessel wall and lumen, as it requires complete blood replenishing to achieve luminal blood suppression [13]. An improved motion-sensitized driven equilibrium iMSDE technique that was originally developed for carotid artery imaging [13] , [14] has been recently shown to achieve more time efficient acquisition and more accurate depiction of the carotid artery luminal boundaries. The objective of the current study was to investigate whether the iMSDE preparation [14] could also be applied for CVW imaging and whether these measurements are reproducible. After imaging parameters were determined, the reproducibility of the new method was investigated in the second part of the study. All scans were performed on a clinical 3. Subjects were examined in the supine position. The study was approved by the Maastricht

University Medical Center review board and written informed consent of all participants was obtained prior to inclusion. Compared to the traditional MSDE [13] , the iMSDE technique was selected for this study because the MLEV-4 pulse design provides better immunity to local magnetic field inhomogeneities and the new gradient arrangement is more immune to the degradation caused by eddy currents [14]. These are particularly important merits for high-field cardiac applications where significant field inhomogeneities are usually present.

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Chapter 3 : Down-link beamforming effects on the code orthogonality in UTRA-FDD systems - CORE

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Deterministic blind beamforming algorithms try to separate superpositions of source signals impinging on a phased antenna array by using deterministic properties of the signals or the channels such as their constant modulus or directions-of-arrival. Progress in this area has been abundant over the p Progress in this area has been abundant over the past ten years and has resulted in several powerful algorithms. Unlike optimal or adaptive methods, the algebraic methods discussed in this review act on a fixed block of data and give closed-form expressions for beamformers by focusing on algebraic structures. This typically leads to subspace estimation and generalized eigenvalue problems. After introducing a simple and widely used multipath channel model, the paper provides an anthology of properties that are available, and generic algorithms that exploit them. Abstract â€" The detailed knowledge of the directional characteristics of the mobile radio channel is required to develop directional channel models and to design effi-cient smart antenna concepts for future mobile radio systems. In this paper, we present a high-resolution esti-mation scheme for the d In this paper, we present a high-resolution esti-mation scheme for the directional channel parameters from dual antenna array based channel sounding meas-urements. Finally, we propose a procedure for the model order estimation and discuss some calibration issues. Show Context Citation Context A measurement setup for double-directionalschannel sounding. Measurement System for DoubleDirection Abstract-- We introduce an extended data-model for high resolution channel parameter estimation and parametric channel modeling. Other than the well-known ray-optical based data models which contain only discrete specular propagation paths, we additionally introduce distributed diffuse scattering Other than the well-known ray-optical based data models which contain only discrete specular propagation paths, we additionally introduce distributed diffuse scattering components. To this end a simple parametric data model of the diffuse scattering distribution in the delay domain is proposed. It is demonstrated that also the reliability of high-resolution parameter estimation results in channel sounding measurements can be considerably enhanced. One should note that effective algorithms for the multiplication of the inverse of a Toeplitz matrix with an arbitrary vector have been developed using the We describe a multidimensional maximum likelihood estimator for radio channel parameters. We also derive a data model to describe the complete data, that is virtually applicable to every antenna array geometry. The proposed iterative gradient based algorithm has been developed, since algorithms usin The proposed iterative gradient based algorithm has been developed, since algorithms using component-wise updates of the likelihood function shows a slow convergence, if at least two propagation paths with nearly the same parameters exist in the measured radio propagation scenario, that means if super-resolution is necessary. The algorithm provides furthermore a variance estimate of the estimated parameters, since the Fisher-information matrix is calculated throughout the algorithm. Signal Processing , " High-resolution parameter estimation techniques have recently been applied to jointly estimate multiple signal parameters. In this work, we consider the problem of determining the directions and center frequencies of a number of narrowband sources in a band of interest. We present a joint angle-fre A perturbation error analysis gives bounds on the parameter estimates and provides optimal values for the temporal and spatial smoothing parameters. The analysis is shown to be consistent with simulation results. Wang - Progress in Electromagnetics Research , " Abstractâ€"In this paper, a novel source localization scheme is proposed based on the unitary ESPRIT algorithm with back ray tracing technique and the city electronic maps. Our scheme can be summarized into two steps. First, the unitary ESPRIT algorithm is employed to estimate the angles and delays of the arrival rays radiated from the source. Second, based on the obtained information we devise a back ray tracing technique to recover the signal propagation paths according to the Geometrical Theory of

Reflections and the city electronic map. After these two steps the source position can be obtained by averaging all the estimated positions. In order to minimize estimated errors caused by the Unitary ESPRIT, a valid-range selection criterion for the judgment of the validity of the estimated position data is proposed. On the other hand, we introduce a path length weighting factor to reduce the estimated errors caused by the terrain data inaccuracy. This position method can locate both the line of sight LOS and non-line of sight NLOS sources efficiently and it also can locate multi-sources simultaneously. Six simulations are carried out in three terrain scenarios. The numerical results demonstrate that our model can be applied to estimate the positions for both 2D and 3D cases. We describe a measurement and parameter identification procedure for the mobile radio propagation channel which includes the azimuth directions of the propagating waves at both link ends, elevation at the base station, time delay, and Doppler shift. The measurement is based on a broadband, real-time The measurement is based on a broadband, real-time multiple-input-multiple-output radio channel sounder. We derive the underlying data model and propose a multidimensional joint parameter estimation procedure from measurements which is based on the M-D ESPRIT algorithm. The resolution of coherent paths by subspace smoothing and the Show Context Citation Context Since the channel sounder measures in the time domain, the data are transformed into the frequency domai Molisch - in Proc. Conf , " In multiple-input multiple-output MIMO systems the horizontal orientation of a linear array has, in some situations, a large influence on the available channel capacity. In this paper we investigate the effect of horizontal array orientation on channel capacity, eigenvalue distribution and antenna In this paper we investigate the effect of horizontal array orientation on channel capacity, eigenvalue distribution and antenna complex correlation coefficient in such systems. We present channel measurements in an office corridor environment for a 6 6 MIMO system and compare the capacity results to those of a physical and non-physical model based on the measurements. The results show that under LOS conditions the channel capacity can vary significantly depending on the receiver array orientation in the horizontal plane. The sub-channels measured over MHz are inverse Fourier transformed to yield the impulse response. The source order i. Space-time processing based on antenna arrays is considered to significantly enhance the performance of the third and fourth generation of mobile radio systems. The expected advantages are increased capacity and better quality of supplied services. High data rates are required and the highest rates High data rates are required and the highest rates per user are expected if multiple antennas are used at both receive and transmit sites. This paper trying to analysis and improve the capacity of single MIMO channel link with the help of pattern diversity. Simulations of fractal tree arrays are conducted so their spatial correlation and MIMO channel capacity can be observed. Capacity improvement from two different FTA is reported, assuming a perfect feedback channel. INTRODUCATION The fourth generation 4G based mobile communication is rapidly improving for better improving broadband connection and better quality of wireless connectivity satisfying the high speed data rate such as application software and video streaming from a smart phone [1] with the MIMO system in which multiple antennas are used at both transmitter and receiver, have been proposed to achieve high data rate due to an improvement in spectrum efficiency. There are several polarized models taking into account both the azimuth and elevation angles. To derive higher data rate and find out the azimuth and elevation angles and for better quality we are Powered by:

Chapter 4 : Martin Haardt - The Mathematics Genealogy Project

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