



US006931362B2

(12) **United States Patent**  
Beadle et al.

(10) **Patent No.:** US 6,931,362 B2  
(45) **Date of Patent:** Aug. 16, 2005

(54) **SYSTEM AND METHOD FOR HYBRID MINIMUM MEAN SQUARED ERROR MATRIX-PENCIL SEPARATION WEIGHTS FOR BLIND SOURCE SEPARATION**

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/713,107**

(22) Filed: **Nov. 17, 2003**

(65) **Prior Publication Data**

US 2004/0204922 A1 Oct. 14, 2004

**Related U.S. Application Data**

(60) Provisional application No. 60/458,038, filed on Mar. 28, 2003.

(51) **Int. Cl.**<sup>7</sup> ..... **G06F 15/00**

(52) **U.S. Cl.** ..... **702/190; 702/189**

(58) **Field of Search** ..... 340/310.03; 367/901; 381/94.1; 455/63.1, 226.1, 501; 702/127, 179, 189, 190, 191, 194, 196

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(57) **ABSTRACT**

A technique for blind source separation ("BSS") of statistically independent signals with low signal-to-noise plus interference ratios under a narrowband assumption utilizing cumulants in conjunction with spectral estimation of the signal subspace to perform the blind separation is disclosed. The BSS technique utilizes a higher-order statistical method, specifically fourth-order cumulants, with the generalized eigen analysis of a matrix-pencil to blindly separate a linear mixture of unknown, statistically independent, stationary narrowband signals at a low signal-to-noise plus interference ratio having the capability to separate signals in spatially and/or temporally correlated Gaussian noise. The disclosed BSS technique separates low-SNR co-channel sources for observations using an arbitrary un-calibrated sensor array. The disclosed BSS technique forms a separation matrix with hybrid matrix-pencil adaptive array weights that minimize the mean squared errors due to both interference emitters and Gaussian noise. The hybrid weights maximize the signal-to interference-plus noise ratio.

**28 Claims, 12 Drawing Sheets**

