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# MUSIC-Like Direction of Arrival Estimation Based on Virtual Array Transformation

Feng-Gang Yan<sup>a,1</sup>, Xue-Wei Yan<sup>a</sup>, Jun Shi<sup>\*c</sup>, Jun Wang<sup>a</sup>, Shuai Liu<sup>a</sup>, Ming Jin<sup>a</sup>, Yi Shen<sup>b</sup>

<sup>a</sup>*School of information and Electrical Engineering, Harbin Institute of Technology at Weihai, Weihai 264209, China,*

<sup>b</sup>*School of Astronautics, Harbin Institute of Technology, Harbin 150001, China,*

<sup>c</sup>*Communication Research Center, Harbin Institute of Technology, Harbin 150001, China.*

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## Abstract

In this paper, we propose a reduced-complexity algorithm to estimate the direction of arrivals (DOAs) of multiple uncorrelated narrow-band signals. We show that with an array of arbitrary configuration, the real part of the array covariance matrix can be equivalently reformulated as an entire array covariance matrix received by a virtual array with potential signal model available for DOA estimate. We provide in-depth insights into the eigenvalue decomposition (EVD) on the real part of the array covariance matrix, based on which we propose a novel virtual array transformation multiple signal classification (VAT-MUSIC) algorithm for DOA estimation with efficient real-valued computations. The new algorithm is able to reduce about 75% computational complexity and it has easy implementation advantages over state-of-the-art real-valued techniques. Furthermore, the performance of the proposed algorithm is theoretically analyzed and a closed-form expression is

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\*Corresponding author.  
E-mail address: dr.junshi@gmail.com.

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