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Local oscillator parameter estimation of collaborative beamforming nodes

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Umar Suleiman Dauda [1,2,*], Nik Noordini Nik Abdl Malik [1], Mazlina Esa [1], Mohd Fairus Mohd Yusoff [1], Mohamed Rijal Hamid [1]

[1] Department of Communication Engineering, Faculty of Electrical Engineering, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor, Malaysia
[2] Department of Electrical & Electronics Engineering, Federal University of Technology Minna, P. M. B. 65, Niger State, Nigeria

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ABSTRACT

Parameter estimation of complex exponential signals corrupted by additive white Gaussian noise (AWGN) is crucial in the study of distributed beamforming in a practical scenario. Near zero (0) phase offset are expected at the receiver end which rely on the smoothing and correction of the frequency and phase estimates. Neither computational complexity nor the processing latency has an effect on the expected zero phase offset but the estimation accuracy does. Thus, the maximum likelihood estimator (MLE) using Fast Fourier Transform (FFT) approach is being considered for cases with none and post processing in locating of the maximum peaks. Details on how the phase estimates are arrived at is not always covered in literatures but explained in the article. Numerical results obtained showed that global maximum peaks are arrived at by employing a fine search with higher values of FFT.

1. Introduction

Longer directional transmission range, improved signal-to-noise ratio (SNR), shared energy among the collaborative nodes and nodes' redundancy are few advantages that are inherent in collaborative beamforming (CB). CB is achieved when two or more devices jointly send same signal message to a distant receiver for the purpose of the mentioned advantages [1,2]. Theoretical analysis of CB for the purpose of steering virtual antenna beams towards a receiver is considered in [3] for both linear and circular array configurations. Achieving CB practically comes with challenges in terms of transmission medium as well as the hardware devices themselves. While the medium affects the

* *Corresponding author.*
E-mail address: usdauda@gmail.com (Umar Suleiman Dauda)