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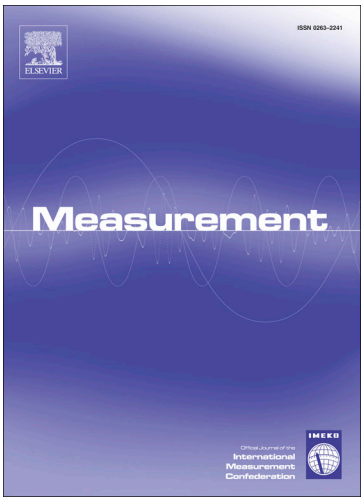

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Daniel Belega, Dario Petri, Dominique Dallet

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Accurate Amplitude and Phase Estimation of Noisy Sine-waves via Two-Point Interpolated DTFT Algorithms

Daniel Belega[1], Dario Petri[2], and Dominique Dallet[3]

[1] Department of Measurements and Optical Electronics, Politehnica University Timişoara,

Bv. V. Pârvan, Nr. 2, 300223, Timişoara, Romania,

Phone: +40 2 56 40 33 65, Fax: +40 2 56 40 33 62, E-mail: *daniel.belega@upt.ro*

[2] Department of Industrial Engineering, University of Trento,

Trento 38123, Italy,

Phone: +39 0461 883902, Fax: +39 0461 882093, E-mail: *dario.petri@unitn.it*

[3] IMS Laboratory, Bordeaux INP, University of Bordeaux, CNRS UMR5218,

351 Cours de la Libération, Bâtiment A31, 33405, Talence Cedex, France,

Phone : +33 5 40 00 26 32, Fax : +33 5 56 37 15 45, E-mail: *dominique.dallet@ims-bordeaux.fr*

Abstract *— The estimation of the amplitude and the phase parameters of a noisy real-valued sine-wave by means of the two-point Interpolated Discrete-Time Fourier Transform (IpDTFT) algorithms based on the Maximum Sidelobe Decay (MSD) windows is analysed in this paper. In particular, the DTFT samples and the IpDTFT frequency estimator that minimize the contribution of either the spectral image component or wideband noise are determined and the related estimation procedures are presented. Once the number of analysed sine-wave cycles and the signal-to-noise ratio are given, a procedure for the selection of the most accurate estimator is then proposed. Finally, the accuracies of the proposed procedures and the classical two-point IpDFT algorithm are compared with each other through both simulation and experimental results.*

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