

Accepted Manuscript

FFT formulations of adaptive Fourier decomposition

You Gao, Min Ku, Tao Qian, Jianzhong Wang

PII: S0377-0427(17)30200-5

DOI: <http://dx.doi.org/10.1016/j.cam.2017.04.029>

Reference: CAM 11109

To appear in: *Journal of Computational and Applied Mathematics*

Received date: 22 December 2016

Please cite this article as: Y. Gao, M. Ku, T. Qian, J. Wang, FFT formulations of adaptive Fourier decomposition, *Journal of Computational and Applied Mathematics* (2017), <http://dx.doi.org/10.1016/j.cam.2017.04.029>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



FFT Formulations of Adaptive Fourier Decomposition

You Gao^{a,*}, Min Ku^{b,*}, Tao Qian^{a,*}, Jianzhong Wang^{c,*}

^aDepartment of Mathematics, University of Macau

^bCIDMA, Department of Mathematics, University of Aveiro

^cDepartment of Mathematics and Statistics, Sam Houston State University

Abstract

Adaptive Fourier decomposition (AFD) has been found to be among the most effective greedy algorithms. AFD shows an outstanding performance in signal analysis and system identification. As compensation of effectiveness, the computation complexity is great, that is especially due to maximal selections of the parameters. In this paper, we explore the discretization of the 1-D AFD integration via with discrete Fourier transform (DFT), incorporating fast Fourier transform (FFT). We show that the new algorithm, called FFT-AFD, reduces the computational complexity from $\mathcal{O}(MN^2)$ to $\mathcal{O}(MN \log N)$, the latter being the same as FFT. Through experiments, we verify the effectiveness, accuracy, and robustness of the proposed algorithm. The proposed FFT-based algorithm for AFD lays a foundation for its practical applications.

Keywords: Fast Fourier transform, Computational complexity, Adaptive decomposition, Greedy algorithm, Reproducing kernel Hilbert space

MSC(2010): 42A50, 32A30, 32A35, 46J15

Contents

1	Introduction	2
2	Preliminaries	3
3	FFT formulation	5
4	Numerical experiments	11

*Email address: map2gao@gmail.com(You Gao), kumin0844@163.com(Min Ku), fsttq@umac.mo(Tao Qian), jzwang@shsu.edu(Jianzhong Wang).

Download English Version:

<https://daneshyari.com/en/article/5776113>

Download Persian Version:

<https://daneshyari.com/article/5776113>

[Daneshyari.com](https://daneshyari.com)