

Author's Accepted Manuscript

Complex-valued Differential Operator-based
Method for Multi-component Signal Separation

Baokui Guo, Silong Peng, Xiyuan Hu, Pengcheng
Xu



PII: S0165-1684(16)30241-9
DOI: <http://dx.doi.org/10.1016/j.sigpro.2016.09.015>
Reference: SIGPRO6270

To appear in: *Signal Processing*

Received date: 22 April 2016
Revised date: 6 August 2016
Accepted date: 25 September 2016

Cite this article as: Baokui Guo, Silong Peng, Xiyuan Hu and Pengcheng Xu
Complex-valued Differential Operator-based Method for Multi-component
Signal Separation, *Signal Processing*
<http://dx.doi.org/10.1016/j.sigpro.2016.09.015>

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 galley proof before it is published in its final citable 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.

Complex-valued Differential Operator-based Method for Multi-component Signal Separation

Baokui Guo^a, Silong Peng^a, Xiyuan Hu^{a,*}, Pengcheng Xu^b

^a*Institute of Automation, Chinese Academy of Sciences, Beijing, China, 100190*

^b*Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing*

Abstract

The null space pursuit (NSP) algorithm is an operator-based signal separation approach which separates a signal into a set of additive subcomponents using adaptively estimated operators and parameters. In this paper, a new operator termed complex-valued differential (CD) operator is proposed. Combining with the CD operator, this paper proposes NSP-CD algorithm to solve the CD operator-based signal separation problem. The NSP-CD algorithm can separate the multi-component signal into sum of amplitude-modulated and frequency-modulated (AM-FM) signals in the form of $A(t)\exp(j(\phi(t)))$. The proposed NSP-CD algorithm has many advantages. Firstly, the proposed CD operator can ensure that the AM-FM signal totally lies in the null space of the operator rather than close to the null space that the original used operator may reach. Secondly, compared with the original NSP algorithm, our algorithm provides a more reasonable strategy to update the regularization parameter λ and the leakage factor γ . Finally, we have proved that the proposed algorithm has quadric convergence theoretically. Experiments on both synthetic and real-life signals demonstrate that the NSP-CD algorithm is more robust and effective than other state-of-the-art methods.

Keywords: Operator-based signal separation, Null space pursuit, Complex-valued differential operator, Empirical mode decomposition, Synchrosqueezing wavelet transform, AM-FM signal.

*Corresponding author

Email address: xiyuan.hu@ia.ac.cn (Xiyuan Hu)

Download English Version:

<https://daneshyari.com/en/article/4977526>

Download Persian Version:

<https://daneshyari.com/article/4977526>

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