

Accepted Manuscript

Bi-dimensional variational mode decomposition of laser speckle contrast imaging data: A clinical approach to critical limb ischemia?

Anne Humeau-Heurtier, Pierre Abraham, Samir Henni

PII: S0010-4825(17)30134-8

DOI: [10.1016/j.combiomed.2017.05.012](https://doi.org/10.1016/j.combiomed.2017.05.012)

Reference: CBM 2667

To appear in: *Computers in Biology and Medicine*

Received Date: 24 March 2017

Revised Date: 11 May 2017

Accepted Date: 11 May 2017

Please cite this article as: A. Humeau-Heurtier, P. Abraham, S. Henni, Bi-dimensional variational mode decomposition of laser speckle contrast imaging data: A clinical approach to critical limb ischemia?, *Computers in Biology and Medicine* (2017), doi: 10.1016/j.combiomed.2017.05.012.

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.



Bi-dimensional Variational Mode Decomposition of Laser Speckle Contrast Imaging Data: a Clinical Approach to Critical Limb Ischemia?

Anne Humeau-Heurtier, Pierre Abraham, and Samir Henni

*A. Humeau-Heurtier is with Univ Angers, LARIS – Laboratoire Angevin de Recherche en Ingénierie des Systèmes, 49000 Angers, France e-mail: anne.humeau@univ-angers.fr
P. Abraham and S. Henni are with University hospital, Lab Physiology and Vascular Investigations, 49000 Angers, France.*

Abstract

The number of patients suffering from peripheral arterial occlusive disease (PAOD) is growing worldwide. PAOD corresponds to an impairment of perfusion in the distal portion of some arteries that can generate critical limb ischemia. For some patients, the pathology leads to the necessity of amputation. PAOD may be diagnosed and studied with transcutaneous oxygen (tcpO₂) measurements. However, the tcpO₂ technique is a contact technique: probes have to be positioned on the limb, which may be impossible in case of ulcers and can lead to infection risks. We therefore herein propose to study if the laser speckle contrast imaging (LSCI) technique, an optical contactless technique, could be of interest in studying limb ischemia. For this purpose, tcpO₂ and LSCI data were recorded in 48 persons suffering or not from PAOD (different levels of criticality). The LSCI data were then processed with the recently introduced bi-dimensional variational mode decomposition (2D-VMD). 2D-VMD leads to band-limited intrinsic mode functions (LSCI 2D-BLIMFs in our case). From these LSCI 2D-BLIMFs, we propose a new index. Our results show that this index and the tcpO₂ values have a Pearson's r correlation coefficient of -0.401 . Moreover, the Bland-Altman graph shows that the LSCI 2D-BLIMFs-based index and the tcpO₂ values are consistent. LSCI might therefore be of interest for a contactless study of limb ischemia.

Keywords: Laser speckle contrast imaging, multiresolution decomposition, peripheral arterial occlusive disease, transcutaneous pressure oxygen,

Download English Version:

<https://daneshyari.com/en/article/4964976>

Download Persian Version:

<https://daneshyari.com/article/4964976>

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