

**MULTIFRACTAL ANALYSIS OF LASER DOPPLER FLOWMETRY SIGNALS:  
PARTITION FUNCTION AND GENERALIZED DIMENSIONS OF DATA  
RECORDED BEFORE AND AFTER LOCAL HEATING**

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**Abstract**

Laser Doppler flowmetry (LDF) signals - that reflect the peripheral *cardiovascular* system - are now widespread in blood microcirculation research. Over the last few years, the *central* cardiovascular system has been the subject of many fractal and multifractal works. However, only very few multifractal studies of LDF signals have been published. Such multifractal analyses have shown that LDF data can be weakly multifractal but the origin of such characteristics are still unknown. We therefore herein propose a multifractal analysis of LDF signals recorded on the forearm of twelve healthy subjects, before and after skin local heating. The results show that the partition functions for all the signals have power-law characteristics. Moreover, generalized dimensions present very few variations with  $q$  for the signals recorded before heating; these variations are larger 20 minutes after local heating. Physiological activities may therefore play a role in the weak multifractal properties of LDF data.

**Keywords:** generalized dimensions, laser Doppler flowmetry, local heating, microcirculation, multifractal analysis, partition function