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Controlling environmental interference via a 2-phase measurement strategy

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Abstract

A major source of measurements error are those due to external interferences. The control of such errors is of great importance, and often problematic. Such is the case of measuring the flow induced shear stress gradients in a capillary tube and its effect on the response of deposited biological cells. Described is a novel approach of controlling unavoidable interferences. This is based on a 2 phase strategy, where each measured value is extracted separately. Presented are the theoretical conditions enabling such an approach. These were found to be applicable to the task at hand via a specific 2 phase measurement system. While the main objective of this paper concerns basic aspects, some description of the specific capillary system, involving flow and cellular deposits reaction are briefly included.

Keywords: measurement errors, measurement interferences, flow induced shear stress, shear stress on endothelial cells

Nomenclature

x excitation

y response

n interference

e environment

q flow

v velocity

t time

W spatial window

 τ stress ϕ Image distribution $\phi(\tau)$ specific model sought $M(\alpha)$ general model

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