Erythrocytes tracking through a microchannel using an automatic method of image analysis

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Abstract

Ever since the clinical significance of red blood cells (RBCs) deformability became a possible way to diagnose several pathologies, many methods of measuring this phenomenon have been proposed. Some examples are the rheoscopy [2] and micropipette aspiration [5]. Recently, by using a soft lithography technique it is possible to fabricate transparent micrometer-sized channels to study motion and dynamical deformation of cells flowing through the microchannels [3, 4].

In this study, an image processing and analyzing method has been developed in the MATLAB environment, to characterize the motion of RBCs flowing through a microchannel with a smooth contraction shape.

After obtaining the images, it was applied a pre-processing stage, which consisted of removing the background noise and some artifacts, adjust the image contrast and the application of a median filter. For the image segmentation, it was used the watershed approach.

In order to predict the next position of the cells it was used the optical flow [1] and the keyhole model proposed by keyhole-Aldasoro Reys et al [6].

The direction of optical flow, obtained for each region, allowed to place the keyhole model so that it includes the child cell, allowing to identify and characterize the cell.

The complexity of the studied images make difficult the cells segmentation, so some errors in the cells tracking may occur. However the model has proven to be a promising technique for tracking cell.

Keywords: Tracking, Image analysis, erythrocytes, microchannels, blood flowing.

Acknowledgements: The authors acknowledge FCT (Science and Technology Foundation), COMPETE, QREN and European Union (FEDER) under the projects PTDC/SAU-BEB/105650/2008, PTDC/SAU-BEB/108728/2008, PTDC/EME-MFE/099109/2008, and PTDC/SAU-ENB/116929/2010.

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