

## THE HEMODYNAMICS OF VASCULAR REMODELLING

### PROJECT AIM

Fluid mechanics plays a critical role in the formation and adaption of vascular networks. The wall shear stress has been identified as one of the key parameters in this interaction. This project will focus on the quantification of flow conditions relevant for angiogenesis and vascular adaption. With a recently developed micro-PIV method for in-vivo measurement of blood flow, it is possible to measure instantaneous flow and wall shear stress data. This micro-PIV system will be used for in-vivo measurements of the vitelline network and cardiovascular system in chicken embryos.

### PROGRESS

In the application of micro-PIV in blood vessels, one can either choose to use red blood cells as tracer particles, or to add artificial (bio-inert) tracer particles. While the use of red blood cells has the advantage that the system is not affected, it also has disadvantages: the larger depth of correlation and the Fåhræus-Lindqvist effect are two phenomena that may affect the measured velocity profile. To study a significant part of a vessel network, a low microscope magnification is required. The magnification influences the measurement resolution and averaging characteristics, which in turn may affect the flow results. To get better insight in how measured velocities relate to the actual velocity under certain circumstances, we started to investigate the accuracy of the micro-PIV method experimentally when varying several parameters, such as the tracer particles size and the microscope magnification.

### Dissertations

1. P. Vennemann. Particle image velocimetry for microscale blood flow measurement

### SCIENTIFIC PUBLICATIONS

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### PROJECT LEADERS

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### RESEARCH THEME

Complex dynamics of fluids

### PARTICIPANTS

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### COOPERATIONS

Leiden University MC and Erasmus  
MC Rotterdam

### FUNDED

TU Delft  
1<sup>st</sup> 100% 2<sup>nd</sup> - 3<sup>rd</sup> -

### START OF THE PROJECT

2008

### INFORMATION

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