

Please send this report to the Secretary of the European Mechanics Council, Professor Bengt Lundberg, Dept of Mechanical Engineering, Luleå University of Technology, S-951 87 Luleå, Sweden, within one month after the Colloquium.

### General

Euromech Colloquium No: 311

Title: "Blood-Wall-Interaction"

Co-Chairmen: Peter Gaehtgens, Freie Universität Berlin  
Dietmar Lerche, Humboldt Universität Berlin

Place and country: Berlin, Germany - "Haus am Köllnischen Park"

Dates: October 17-20, 1993

### Finance

The conference fee DM 125 included bed and breakfast, coffee service, public transp.

Funding: Deutsche Forschungsgemeinschaft, Senat für Wissenschaft und Forschung von Berlin, Freie Universität Berlin

Accommodation (type and cost): Hotel "Fischerinsel" - DM 140.-/person/night

Meals: "Haus am Köllnischen Park", Hotel "Fischerinsel", Café im Zeughaus

### Participation

Total number of participants: 59

Distribution of participants by country:

| Code | Country        | Number        |
|------|----------------|---------------|
| A    | Austria        | <u>1</u>      |
| B    | Belgium        | <u>      </u> |
| BG   | Bulgaria       | <u>1</u>      |
| CH   | Switzerland    | <u>1</u>      |
| CS   | Czechoslovakia | <u>1</u>      |
| D    | Germany        | <u>26</u>     |
| DK   | Denmark        | <u>      </u> |
| E    | Spain          | <u>      </u> |
| EE   | Estonia        | <u>      </u> |
| F    | France         | <u>4</u>      |
| GB   | Great Britain  | <u>5</u>      |
| GR   | Greece         | <u>2</u>      |
| H    | Hungary        | <u>      </u> |
| I    | Italy          | <u>2</u>      |

| Code | Country     | Number             |
|------|-------------|--------------------|
| IRL  | Ireland     | <u>      </u>      |
| LT   | Latvia      | <u>      </u>      |
| LV   | Lithuania   | <u>      </u>      |
| N    | Norway      | <u>      </u>      |
| NL   | Netherlands | <u>7</u>           |
| P    | Portugal    | <u>      </u>      |
| PL   | Poland      | <u>2</u>           |
| R    | Rumania     | <u>      </u>      |
| S    | Sweden      | <u>      </u>      |
| SF   | Finland     | <u>      </u>      |
| YU   | Yugoslavia  | <u>      </u>      |
| CIS  | CIS         | <u>1</u> (Ukraine) |
| -    | Others      | <u>6</u>           |

(Cuba:1, Israel:1, Japan:2, USA:2)

Is there need of another colloquium on the same subject? Which year? 1995: Blood-Wall-Interaction

# Scientific Report

## SCOPE

The interaction between blood and the walls is a very important and also complex subject that concerns the whole vessel system in the body, a great variety of implants as well as extracorporeal systems like artificial kidneys or the heart lung machines.

For this reason the participants had been invited to contribute not only on mechanical questions but also on biological and biochemical aspects.

The topics were:

- Blood cells and the effect of shear stress
- Endothelial cells and the effect of shear stress
- Flow of particle-rich fluids
- Flow through porous media
- Transport and reaction in the vessel wall
- Experimental methods in small scale flows
- Computational methods in small scale flows
- Lagrangian computational fluid mechanics
- Processes leading to atherosclerotic depositions
- Processes leading to thrombotic depositions

## Program

These topics had been planned to be discussed in 8 sessions:

1. Monday, October 18: Computational and experimental fluid mechanics in vessels  
Computational and experimental fluid mechanics in vessels and ventricels
2. Tuesday, October 19: Computational and experimental fluid mechanics in heart valves  
Influence of the geometry to the local flow  
Flow through permeable membranes
3. Wednesday, October 20: Microcirculation  
The effect of shear stress on blood cells  
The effect of shear stress on endothelial cells

Additionally there were offered the visit of two out of four laboratories in Berlin:

### 1: Virtual Reality - Art & Kom

Computer animated 3D-Performance of the flow through the carotic bifurcation.

### 2: Blood Rheology - Humboldt University

Single cell manipulation equipment, cell transit analyzer, hemorheological methods (filters, light back scattering aggregometer, sedimentation/packing analyzer), viscosimeter (low shear, high shear), heart valve test systems.

### 3: Blood Rheology - Free University

Vital videomicroscopy of animal and human microcirculation, in vitro blood perfusion of small glass capillaries, endothelial cell culture, flow chamber for studies of PMN-endothelial cell interactions.

#### 4: Biofluidmechanics - Free University

Ten times enlarged model flow channel, highly accurate heart valve tester, flow image velocimetry, mechanical circulatory models, mathematical circulatory models, implantable circulatory assist system under development.

#### **Conclusions**

According to the statements of the participants the workshop was a success. The participants liked the mixture of exact sciences and natural sciences. The next chairman intends to continue this line.

#### **Next meeting**

It was agreed, that the next Euromech colloquium concerning biofluidmechanics will take place in London in 1995. Prof. Caro has been asked to be the next chairman and he accepted it.

*Held*