

EUROMECH Colloquium 554

“Dynamics of Capsules, Vesicles and Cells in Flow”

15 – 18 July, 2014, Compiègne, France

Chairperson: Dr. Anne-Virginie Salsac

Co-Chairperson: Dr. Mark Blythe

The DynaCaps 2014 Symposium on the “Dynamics of Capsules, Vesicles and Cells in Flow”, designated EUROMECH Colloquium 554, was held at the University of Technology of Compiègne (UTC) in Compiègne (France) on July 15-18, 2014. It received the support of the European Mechanics Society, International Union of Theoretical and Applied Mechanics, Association Française de Mécanique and the Région Picardie.

Scope of the Colloquium

Encapsulated soft particles are commonly encountered in nature (seeds, cells, phospholipid vesicles) and in different industrial applications (biotechnology, pharmacology, cosmetics, food industry). The role of encapsulation is to protect a substance with a solid envelope. It avoids its dispersion in the ambient environment or its degradation in contact with it. The membrane may be a lipid bilayer (vesicles), a reticulated membrane with elastic properties (artificial capsules) or a lipid bilayer connected to a cytoskeleton (cells).

Various aspects of the mechanics of capsules/vesicles/cells were covered during the meeting:

- Characterization of their mechanical properties, which is difficult owing to their small size and fragility;
 - Role of the fabrication process on the physical and mechanical properties of artificial capsules or vesicles (shape, size, degree of reticulation, membrane mechanical properties). Controlling the membrane properties is essential to optimize the design and production of specific particles for each application;
 - Deformation of the capsules/vesicles/cells when suspended in an external flowing fluid
- The Symposium has brought together theoreticians and experimentalists who work on the mechanics, physics and biology of capsules/vesicles/cells.

EUROMECH Colloquium 554 provided the opportunity to confront the various approaches used to study the flow and deformation of such deformable particles. Relatively few experimental studies of these phenomena exist, but recent progress in microtechnology has opened new perspectives. The motion and deformation of these particles is a complex fluid-structure interaction problem. The present numerical models all include simplifying assumptions, the relevance of which has yet to be established. The Colloquium provided an opportunity for discussion of current results and the needs of future research.

Best Poster Award

The committee was composed of the invited speakers. The Best Poster prize was awarded to Matsanuga Daiki, Tohoku University (Japan).

Best Presentation Award

All the graduate students served as members of the Best Presentation Award committee. The prize was awarded to Merkel Tobias, Karlsruhe Institute of Technology (Germany).