International Scientific Symposium

DynaCaps

Dynamics of Capsules, Vesicles and Cells in Flow

10 -13 July 2023

PROGRAM

Université de Technologie de Compiègne

WELCOME MESSAGE

On behalf of the International Union of Theoretical and Applied Mechanics and of the Université franco-allemande/Deutsch-Französische Hochschule, it is our great pleasure and honor to welcome you to the Symposium “Dynamics of Capsules, Vesicles and Cells in Flow”, which will take place at the University of Technology of Compiègne (UTC) in Compiègne, France.

The objective of the Symposium is to bring together theoreticians and experimentalists who work on the mechanics, physics and biology of capsules/vesicles/cells. It will provide the opportunity to confront the various approaches used to study such challenging particles and establish some guidelines for future research.

We wish you a very successful and enjoyable meeting.

Anne-Virginie Salsac and Christian Wagner

SPONSORS

International Union for Theoretical and Applied Mechanics (IUTAM)

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European Research Council

CONFERENCE ORGANIZATION

ORGANIZING COMMITTEE

- **Anne-Virginie Salsac**, UTC, France, Chair
- **Christian Wagner**, Saarland University, Germany, Co-chair
- **Claire Dupont**, UTC, France
- **Catherine Lacourt**, **Alexandra Garnier,** UTC, France

LOCAL COMMITTEE

Jérémy Audierne, Dominique Barthès-Biesel, Alaa Bou-Orm, Ali Chakiri, Isabelle Claude, Elena Cutri, Florian De Vuyst, Chaymae El-Mertahi, Abdelhadi Essamlali, Nicolas Grandmaison, Gabriel Guerin, Tanguy Hallegouet, Xu-Qu Hu, Yeming Huang, Rachid Jellali, Badr Kaoui, Anne Le Goff, Alexandre Martins, Julien Massoni, Lisa Morisseau, Sébastien Quedvillle, Hudie Sun, Anouk Thomas

INTERNATIONAL SCIENTIFIC COMMITTEE

- **Valeria Garbin**, Delft University of Technology (The Netherlands)
- **Anne Juel**, University of Manchester (UK)
- **Takuji Ishikawa**, Tohoku University (Japan)
- **Zhangli Peng,** University of Illinois (USA)
- **Anne-Virginie Salsac**, Université de Technologie de Compiègne (France)
- **Petia Vlahovska**, Northwestern University (USA)
- **Christian Wagner**, Saarland University (Germany)

CONFERENCE VENUE

The Symposium will take place on the UTC Research Campus, located about 3 km from the city centre. It will be held in the building **Centre d'innovation**.

Centre d'innovation

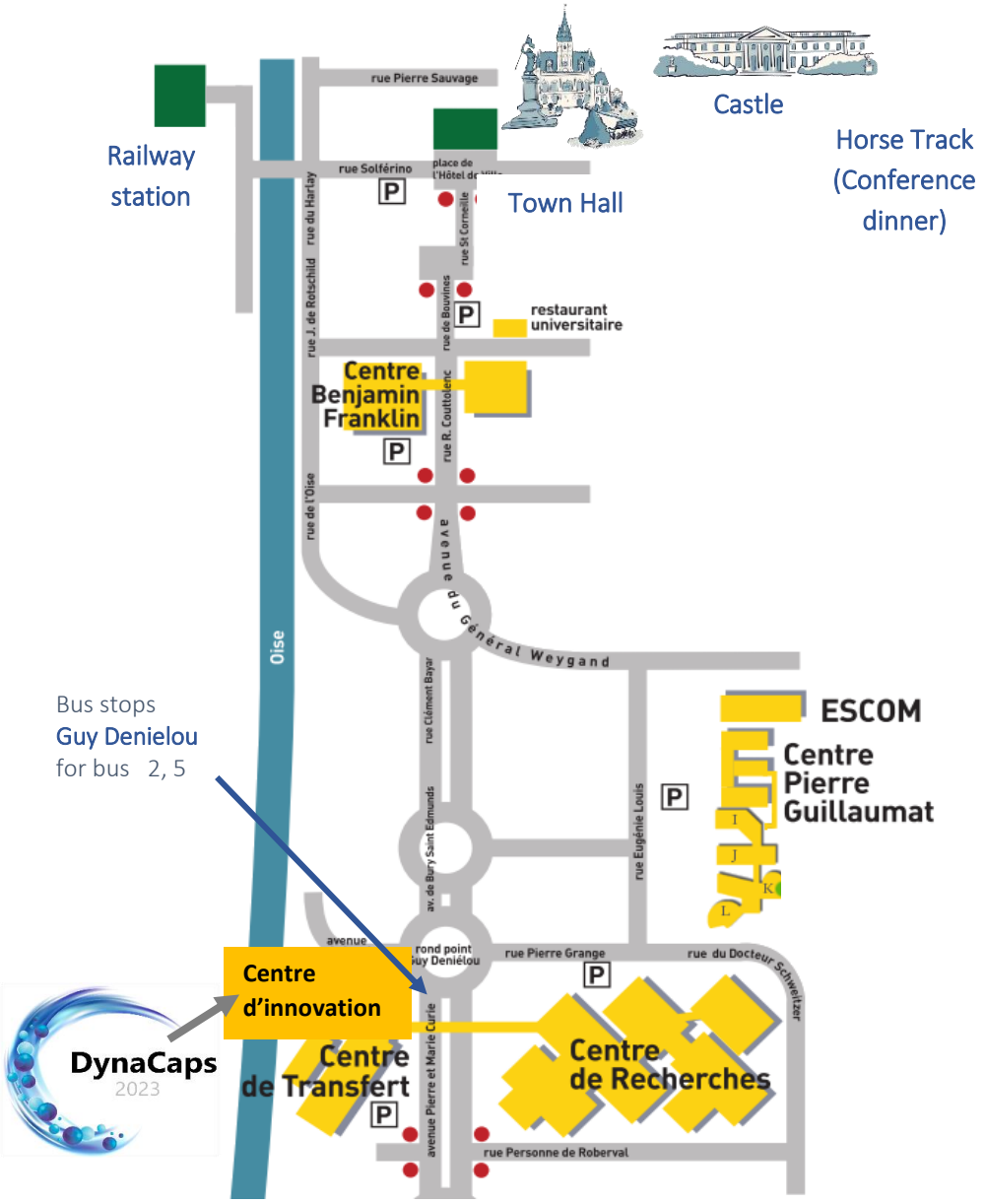
From the railway station and many other locations downtown, take bus 2 or 5 (bus stop **Guy Denielou**). Buses are free of charge in Compiègne. There is also the possibility to take a taxi.

TAXI:

TAXI LECOMTE
Phone: +33 (0)6 07 54 02 27
Email: taxilecomtecompiegne@gmail.com

TOP Taxi
Phone: +33 (0)6 50 66 51 50
Email: Toptaxi@laposte.net

CONFERENCE VENUE



RESTAURANT

OPEN FOR LUNCH AND DINNER

La Brasserie Parisienne (7:30 to 23:00)
17 Rue Jean Legendre
Phone: +33 3 44 42 29 77

Soprano (12:00 to 14:30 and 19:00 to 22:30)
22 Rue Jean Legendre
Phone: +33 3 44 40 04 06

Le Bistrot des Arts (12:00 to 13 :45 and 19:30 to 21:45)
35 Cours Guynemer (near Beaux Arts Hotel)
Phone : +33 7 79 55 55 87 (Closed on Sunday)

Bistrot du Terroir (12:00 to 14 :00 and 19:00 to 22:00)
13 rue Eugène Floquet
Phone : +33 3 44 40 06 36 (Closed on Sunday)

Other restaurants are listed on dynacaps.utc.fr

WIFI ACCESS

A login and a password will be given to you upon your registration. They will allow you to connect to the UTC network. It is also possible to connect to the EDUROAM network.

SOCIAL PROGRAM

WELCOME RECEPTION

The welcome reception will be held on Monday July, 10th at 18:30 in the City Hall.

VISIT OF COMPIEGNE PALACE OR WALK IN FOREST

Two options are proposed on Wednesday July, 12th:

- **Option 1**: commented visit of Compiègne palace starting at 4 pm followed by a free visit of the beautiful palace garden. Registration mandatory.

- **Option 2**: walk in Compiègne forest (Sneakers or walking shoes recommended). Registration mandatory.

CONFERENCE DINNER

The conference dinner will be held at 6:45pm at Restaurant de l'Hippodrome (Avenue du Baron Roger de Soultrait, Compiègne). The menu will contain a choice of dishes that accommodate different dietary requirements.

The restaurant is located close to Compiègne Palace, and is about 1.5 km away from Compiègne city center. It will thus be easy to reach your hotel after dinner.

MONDAY, JULY 10TH

13:00	***REGISTRATION*** ***welcome coffee***
14:00	**Opening ceremony** A.-V. Salsac, C. Wagner, C. Rossi, C. Legallais, T. Pedley
	Tribute to Dominique Barthès-Biesel
14:20	**A computational model for the transit of cancer cells through a constricted microchannel** **Y. Sui**
14:55	**Stabilization of rotating toroidal droplets in viscous flow** **A. Nir**, O. M. Lavrenteva, S. Malik, M. Idan
15:13	**Experimental study of red blood cell suspensions** **T. Fischer**
15:31	**Dynamic simulations of deformable drops in confined flows** A. Z. Zinchenko, J. R. Gissinger, G. Roure, **R. H. Davis**
15:49	**Dynamic simulations of an encapsulated microbubble translating in a tube at low capillary and Reynolds numbers** **N. Pelekasis**, M. Vlachomitrou, A. Lytra
16:06	***Coffee break***

MONDAY, JULY 10TH

Tribute to Dominique Barthès-Biesel

16:30	**Soft robotics, Swimming, Fluid-solid interaction, Capsule, Simulation** **T. Ishikawa**, T. Morita, T. Omori
16:48	**Stationary shapes of axisymmetric vesicles beyond lowest-energy configurations** **R. B. Reboucas**, P. Vlahovska, M.J. Miksis
17:06	**Coupling between membrane curvature and transmembrane protein activity** **M. A. Djibaoui**, R. Bouzerar, M. Guedda
17:24	**Interaction damage of two capsules in shear flow: effect of membrane properties differences** **X.-Q. Hu**, C. Dupont, D. Barthès-Biesel, A.-V. Salsac
17:45	***Bus to Compiègne City center***
18:30	***Welcome reception in Compiègne Town Hall***

TUESDAY, JULY 11TH

	Vesicles
9:00	**Role of membrane viscosity in the dynamics of vesicles and capsules** **P. Vlahovska**
9:35	**Measuring elastic properties of extracellular vesicles** H. Kylhammar, V. Pandey, F. Stridfeldt, A. Görgens, S. EL Andaloussi, A. Dev, **D. Mitra**
9:53	**Microfluidic rheology of vesicle prototissues** M. Layachi, L. Casas-Ferrer, G. Massiera, **L. Casanellas**
10:11	**Coated microbubbles exploit shell buckling to swim** G. Chabouh, M. Mokbel, B. van Elburg, M. Versluis, T. Segers, S. Aland, C. Quilliet, **G. Coupier**
10:29	***Coffee break***
	Red Blood Cells
11:00	**Viscosity Measurements of the cytosol of human red blood cells** **T. John**, K. Kretsch, C. Wagner
11:18	**A Lattice-Boltzmann fluid-structure-interaction framework to investigate red blood cell dynamics in microfluidic channels** **A. Mantegazza**, D. De Marinis, M. D. de Tullio
11:36	**Erythrocyte-erythrocyte aggregation dynamics under shear flow** **M. Abbasi**, A. Farutin, H. Ez-Zahraouy, A. Benyoussef, C. Misbah
11:54	**Towards high-throughput rheological assessment of red blood cells in hematology analyzers** P. Taraconat, J.-P. Gineys, F. Nicoud, D. Isebe, **S. Mendez**
12:12	**Towards modelling of the electro-deformation for red blood cells flowing in coulter counters** **A. Spadotto**, D. Di Pietro, S. Mendez

TUESDAY, JULY 11TH

12:30	***Lunch***
	Cells and capsules
13:30	**Transport and mixing of blood suspensions in the microcirculation** **M. Abkarian**
14:05	**Band pattern formation in a suspension of red blood cells during centrifugation in a Percoll density gradient** **F. Maurer**, T. John, A. Darras
14:23	**Rheology of elastic capsules in a confined shear flow** **O. Aouane**, A. Scagliarini, J. Harting
14:41	**Microfluidics and deep learning towards cell mechanical capacity awareness** **M. Maleki**, I. Halima, C. Thomann, G. Frossard, E. Petiot, E. Courtial
14:59	**Numerical investigation of a single capsule in vortical cross-slot flows under moderate inertia** **K. Kechagidis**, B. Owen, H. Tse, D. Di Carlo, T. Krüger
	Poster Presentation
15:17	**Capillary network flow of white blood cells in vivo** **K. Larhrissi**, C. Wagner, F. Milan Maurer, A. Darras, M. Laschke
	Time-dependent flow of red blood cells in a constricted channel **Y. Rashidi**, T. John, C. Wagner, S. M. Recktenwald
	The effect of glycocalyx alteration on red blood cells aggregation **M. Jin**, M. Abbasi, C. Misbah
	Red blood cells adhesion and its Influence on capillary flow in-vivo microvasculature: a simulation study **M. Bendaoud**, A. Darras, Y. Rashidi, M. Abbasi, H. Ez-zahraouy, Christian Wagner, C. Misbah

Investing the impact of age and membrane rigidity on the deformability of red blood cells in microfluidic single-cell flow
M. Nouaman, A. Darras, C. Wagner, S. M. Recktenwald

Erysense : a microfluidic-based instrument for AI-powered assessment of red blood cell morphology in flow
S. M. Recktenwald, G. Simionato, M.G. M. Lopes, L. Kaestner, C. Wagner, S. Quint

Data-driven kinematics-consistent model order reduction of fluid-structure interaction
C. Dupont, F. De Vuyst, A.-V. Salsac

Numerical investigation of heterogeneous soft particle pairs in inertial microfluidics
B. Owen, K. Thota, **T. Krüger**

Buckling of pressurized active shell
V. Agrawal, **V. Pandey**, D. Mitra

Calibration of discrete spring network fibroblast model
A. Anandan, C. Marquette, A . Perraud, E.-J. Courtial

Analysis on the locomotion dynamics of Chlamydomonas encapsulated liposomes
S. Hamaguchi, S. Shiomi, D. Matsunaga, M. Hayashi, T. Kaneko

15:39 ***Posters session and Coffee break***

Vesicles

16:30 **A fluid-structure interaction method for simulating capsule sorting in curved microchannels**
D. DeMarinis, A. Mantegazza, M. D. de Tullio

16:48 **Modelling of damage and strain localization of a capsule in flow**
N. Grandmaison, D. Brancherie, A.-V. Salsac

TUESDAY, JULY 11TH

17:06 **Microrheometric study of damage and rupture of capsules in simple shear flow**
C. El Mertahi, N. Grandmaison, C. Dupont, R. Jellali, D. Brancherie, A.-V. Salsac

17:24 **Fully Eulerian models for fluid-structure interaction: application to the simulation of deformable capsules**
M. Cialella, T. Milcent

17:42 **Phase-field modeling of capsules, vesicles and cells and microfluidic applications**
M. Kloppe, D. Mokbel, M. Mokbel**, S. Aland**

WEDNESDAY, JULY 12TH

	Red Blood Cells
9:00	**Transient behavior of simple and not-so-simple cells in blood flow** **S. Gekle**
9:35	**On the impact of Lingering RBC on the Reverse Partitioning in capillary networks** **A. Bucciarelli**, A. Mantegazza, D. Obrist
9:53	**In vivo and in silico red blood cell lingering and partitioning in the microcirculation** Y. Rashidi, G. Simionato, Q. Zhou, T. John, T. Krüger, L. Kaestner, M. W. Laschke, M. D. Menger, C. Wagner, **A. Darras**
10:11	**Influence of red blood cells on vasodilation of vessels** **A.K. Nayak**, S. L. Das, C. Misbah
10:29	***Coffee break***
	Red Blood Cells
11:00	**Competition between deformation and free volume quantified by 3D image analysis of red blood cell** B. Babaki, D. A. Fedosov, A. Gholivand, J. Opdam, R. Tuinier, **P. Lettinga**
11:18	**Physical mechanisms of red blood cell splenic filtration** A. Moreau, F. Yaya, H. Lu, A. Surendranath, A. Charrier, B. Dehapiot, E. Helfer, **A. Viallat**, Z. Peng
11:36	**Aberrant blood cell margination provokes vascular stress fluctuations in a computational model of blood disorders** X. Cheng, C. Caruso, W. A. Lam, **M. D. Graham**.
11:54	**Sickle cells in microfluidic flow - the potential for drug development, theragnostics and patient prognosis** M. Lopez, M. Qiao, S. M. Recktenwald, T. John, I. Muniansi, P. Joly, E. Nader, C. Wagner, S. Quint, P. Connes, **L. Kaestner**

WEDNESDAY, JULY 12TH

12:12	**Biomolecular and biophysical abnormalities of erythrocytes alter the dynamics of erythrophagocytosis in sickle cell disease** **H. Li**, Y. Qiang, X. Li, P. A. Buffet, M. D., G. E. Karniadakis, S. Suresh
12:30	***Lunch***
	Model systems
13:30	**Microfluidic model of haemodynamics in porous media** **A. Juel**
14:05	**Modelling how curved active proteins and shear flow pattern cellular shape and motility** **S. Sadhukhan**, S. Penic, A. Igic, N. S. Gov
14:23	**Suspensions of viscoelastic capsules: effect of membrane viscosity on transient dynamics** **F. Guglietta**, F. Pelusi, M. Sega, O. Aouane, J. Harting.
14:41	**Locomotion of giant liposome driven by internal Chlamydomonas** S. Shiomi, S. Hamaguchi, D. Matsunaga, **M. Hayashi**, T. Kaneko
	Bus to Compiègne City center
16:00	***Visit of Compiègne Palace or walk in Compiègne forest***
18:45	***Conference dinner***

THURSDAY, JULY 13TH

	Particles and cells
9:00	**Numerical study of the formation and stability of a pair of differently sized particles in inertal microfluidics** **K. Thota**, B. Owen, T. Krüger
9:18	**Numerical investigation of particle separation in dense heterogeneous suspensions of soft particles using inertial microfluidics** **B. Owen**, T. Krüger
9:36	**Fluid mechanical components of high-shear thrombotic flows: from cellular behaviour towards organ-scale diseases** **G. Zavodszky**
9:54	**Heterogeneous ATP patterns in microvascular networks** **Z. Gou**, C. Misbah
10:12	***Coffee break***
	Red Blood Cells
10:45	**Cell-resolved modeling of capillary network-scale blood flow** **P. Bagchi**
11:20	**YOLO algorithm (You Only Look Once) for RBCs aggregate detection : Healthy and diabetic cases** **M. Dynar**, C. Misbah
11:38	**Fast microfluidic device to measure Young's modulus of red blood cells** **S. Kumari**, P. Naik, C. Kaur, T. Roy, V. Mistari, S. Patankar, S. Sen, D. Mitra, D. Paul
11:56	**Electric field modulated spatial distribution of red blood cells in micro flows** **S. Somnath**, A. Farutin, C. Misbah

THURSDAY, JULY 13TH

12:14	**Hematocrit profile relaxation after a T-shaped bifurcation** **K. Useo**, F. Risso, P. Duru, S. Lorthois
12:32	**From the flow of a capsule in a constriction to genetic analysis of individual cells** **A. Leyrat-Maurin**
12:50	**Closing ceremony**
13:00	***Lunch***

DynaCaps

Many thanks to you all for your participation!

Innovation center address:
57 Avenue de Landshut
Compiègne, France