

Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : Given names :

Status (prof., assistant prof., ...):

Laboratory : Website address :
Institution : Website address :

Scientific competence of the supervisor:

Anne-Virginie Salsac is CNRS Director of Research at Université de Technologie de Compiègne and Visiting Professor at Queen Mary University of London. She has been awarded various prizes, including the CNRS bronze medal in 2015, National Order of Merit in 2016, ERC in 2018 for her research on vascular mechanics, the microcirculation and biomedical engineering applications. She has authored over 200 papers and conferences and is co-inventor of one patent. She is strongly involved in dissemination of scientific activities (Femmes en Or, Three-Minute Thesis ...) and has a strong involvement in institutional activities.

Two major publications in the field proposed for the PhD :

1.
2.

Website address of the personal page :

Supervisor's email :

Description of the research work proposed for a PhD **Topic # (see list) :**

Title :

Subject :

Micro-capsules, which are fluid droplets enclosed in a thin elastic membrane, are current in nature (red blood cells) and in various industrial applications (biotechnology, pharmacology, cosmetics, food industry). Artificial microcapsules are used to protect and transport active principles, by isolating them from the external suspending fluid. One application with high potential is their use for drug targeting: once injected in the blood flow, the particles are subjected to complex flow conditions. A technique to increase the transfer properties of capsules is to make the particles non-spherical as it increases the surface-to-volume ratio. Like red blood cells, artificial capsules take complex deformed shapes under flow, with potential membrane wrinkling and fatigue breakup. It is important to predict those phenomena in order to avoid/provoke membrane rupture. The objective of the project is to study the behavior of ellipsoidal microcapsules or cells in suspension and analyze the influence of their shape and membrane properties on their dynamics and wrinkle formation, which has never been done so far. Original and novel enriched modeling strategies will be implemented to simulate the fluid-structure interactions accounting for the finite-thickness of the particle membrane. This project will help optimize capsule design and produce biomimetic models of cells.

Keywords :

Expected collaborations :

- Prof. Barthès-Biesel from the Biomechanics & Bioengineering Laboratory (Université de Technologie de Compiègne, France),
- Prof. Hu from the College of Mechanical and Vehicle Engineering (Hunan University, China),
- Prof. Le Tallec from the Solid Mechanics Laboratory (Ecole Polytechnique, Palaiseau, France),
- Dr Vidrascu from J.-L. Lions Laboratory (Sorbonne University - INRIA-Paris Institute, France).

Background required from the applicant :

We are looking for highly motivated, dynamic, conscientious and rigorous candidates, who will be fully involved in the project and eager to integrate the interdisciplinary BFSI research team.

Technical skills: strong knowledge in fluid and/or solid mechanics, as well as in numerical simulations.

Interest in research topics at the interface between disciplines (in particular in bioengineering/biophysics).

Other skills: proficiency in English, ability to adapt and anticipate, team spirit

Existence of a PDF file detailing the proposal ("yes" or "no") :

(see guidelines on the website www-csc.utt.fr)