ÉCOLE POLYTECHNIQUE

INSTITUT POLYTECHNIQUE DE PARIS

CYCLE DE CONFÉRENCES

Séminaire général de physique de l'Institut Polytechnique de Paris
Département de physique de l'École polytechnique

BLOOD MUST FLOW!

MULTIPHYSICS STUDY OF (MICRO)-VASCULAR FLOWS AND ENDOVASCULAR TECHNIQUES

by Anne-Virginie SALSAC

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Université de Technologie de Compiègne

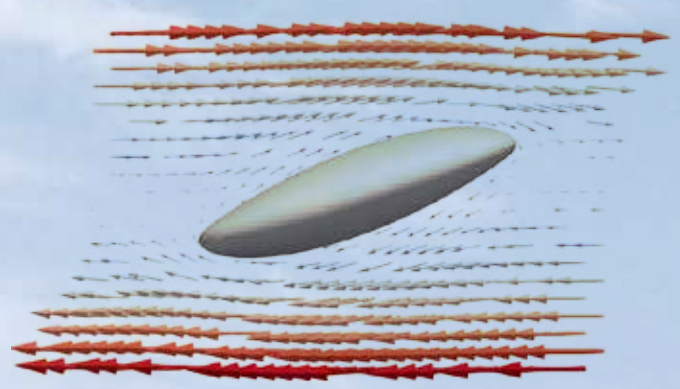
THURSDAY
MAY 21,
2026

5 pm - 6:15 pm
LECTURE HALL
AMPHI PIERRE FAURRE
ÉCOLE POLYTECHNIQUE

Analysing the engineering principles at the heart of the cardiovascular system: this is the challenge of the biomechanics of blood flow. We will explore its contributions to the understanding of blood dynamics from the microcirculation to the large vessels, and to the development of innovative therapeutic techniques that are navigated through the blood vessels.

Mitral valve implantation in a cardiac digital twin

In particular, we will first study how digital twins of the cardiac function help understand heart pathologies and conceive mini-invasive treatment solutions. We will then focus attention on microcapsules, which can be seen as models of cells or as strategies for drug targeted delivery, when designed artificially. The issue is then to guarantee long-enough resistance to hydrodynamic forces, and avoid early breakup of the microcapsules. We will explore how the mechanics of damage and rupture can be modelled numerically under a fluid-structure interaction framework, and measured experimentally on reticulated protein microcapsules.



A microcapsule deformed in a simple shear flow

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