

Research Topic for the Arts et Métiers ParisTech - CSC PhD Program

Subfield: Applied Physics, Fluid Mechanics, Biomechanics

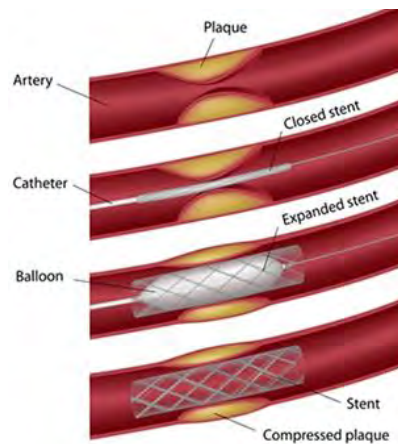
ParisTech School: Angers

Title: Numerical investigation of the coupling between the mass transfer, artery elasticity and hemodynamics

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Short description of possible research topics for a PhD:

In the present research project, we wish to elucidate the role of the wall elasticity and hemodynamics in the phenomena of mass transfer in the case of a bare and a stenosed artery. In the first part of the study, a bare artery will be considered and the deformation of the artery wall will be numerically computed accounting for the coupling between the hydrodynamics and the mechanical behavior of the artery wall. In the second part, a stenosed artery will be considered and the effects of the stenosis on the dynamical response of the arterial wall will be investigated. The impact of the stenosis is expected to influence both the hydrodynamic fields and the deformation of the artery. In the third part, the steady and transient mass transfer in a deformable artery will be studied in the case of a bare and a stenosed artery with and without a drug eluting stent. The expected results should help understanding the complex coupling between the mass transfer phenomena, the artery deformation and the hemodynamics.



Stent angioplasty

Required background of the student: the applying student must have a good background in Fluid Mechanics, Structural Mechanics, Mass Transfer and Computational Methods.

2-3 representative publications of the group:

F. Chabi, S. Champmartin, C. Sarraf and R. Noguera, Critical evaluation of three hemodynamic models for the numerical simulation of intra-stent flows, J. of Biomechanics 48(10), 2015

A. El Baroudi, F. Razafimahery and L. Rakotomanana, Fluid–structure interaction within three-dimensional models of an idealized arterial wall, International Journal of Engineering Science 84, 2014

FOR APPLICATION, PLEASE CONTACT ADVISOR(S) BY EMAIL WITH COPY TO:
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