



POLITECNICO
MILANO 1863

MODELLISTICA E CALCOLO SCIENTIFICO



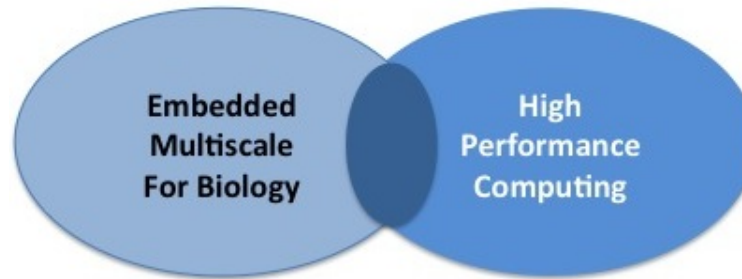
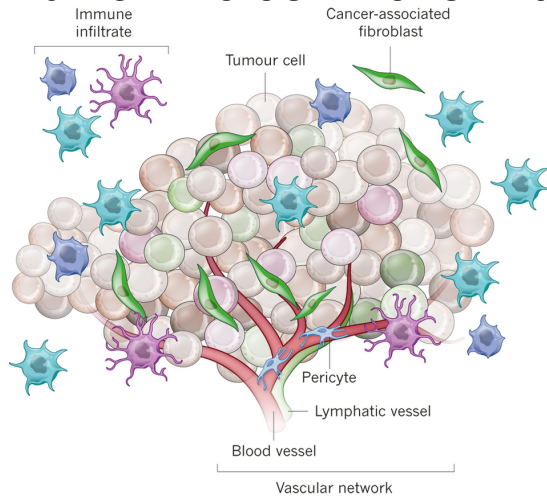
MODELING AND SCIENTIFIC COMPUTING

Proposte di tesi per AIM

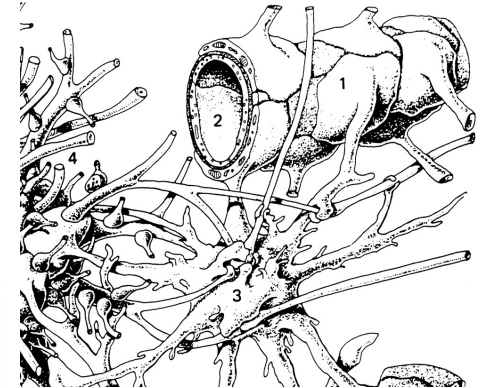
Mercoledì 13 Gennaio 2016 – Paolo Zunino

General context of my research activity

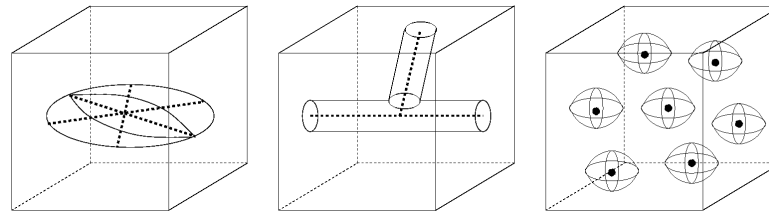
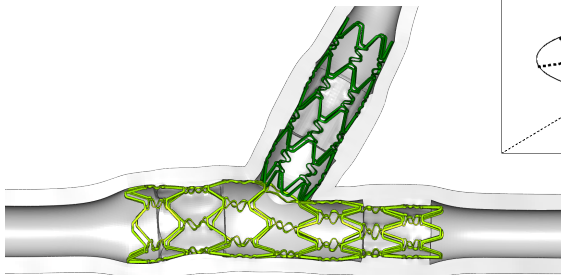
Tumor microenvironment



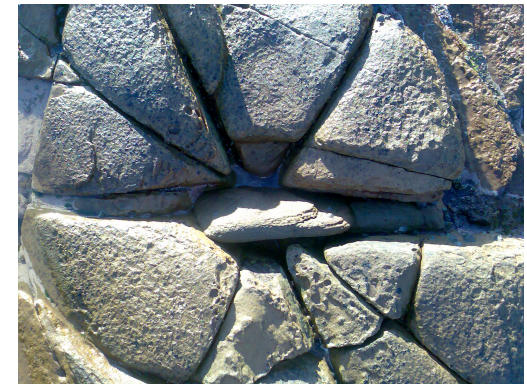
Cerebro-Spinal fluid clearance



Biomedical devices

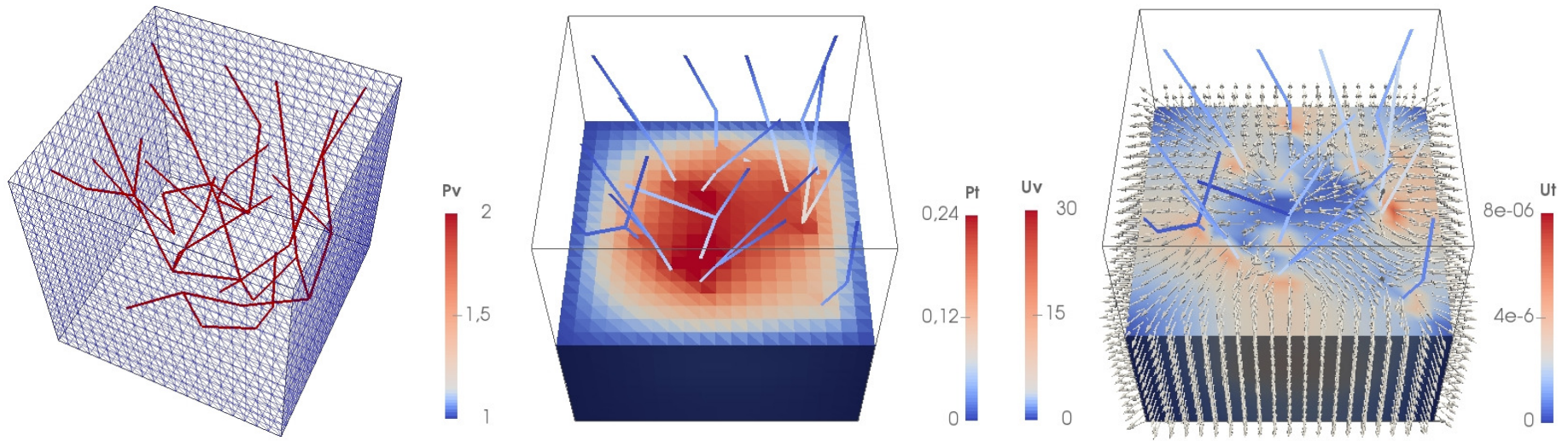


Flow in fractured media



Proposal #1: methodology

Coupled PDEs defined on the network and bulk - mixed finite elements - C++ FEM solver: D. Notaro Ing. Mat. 2016



Developments:

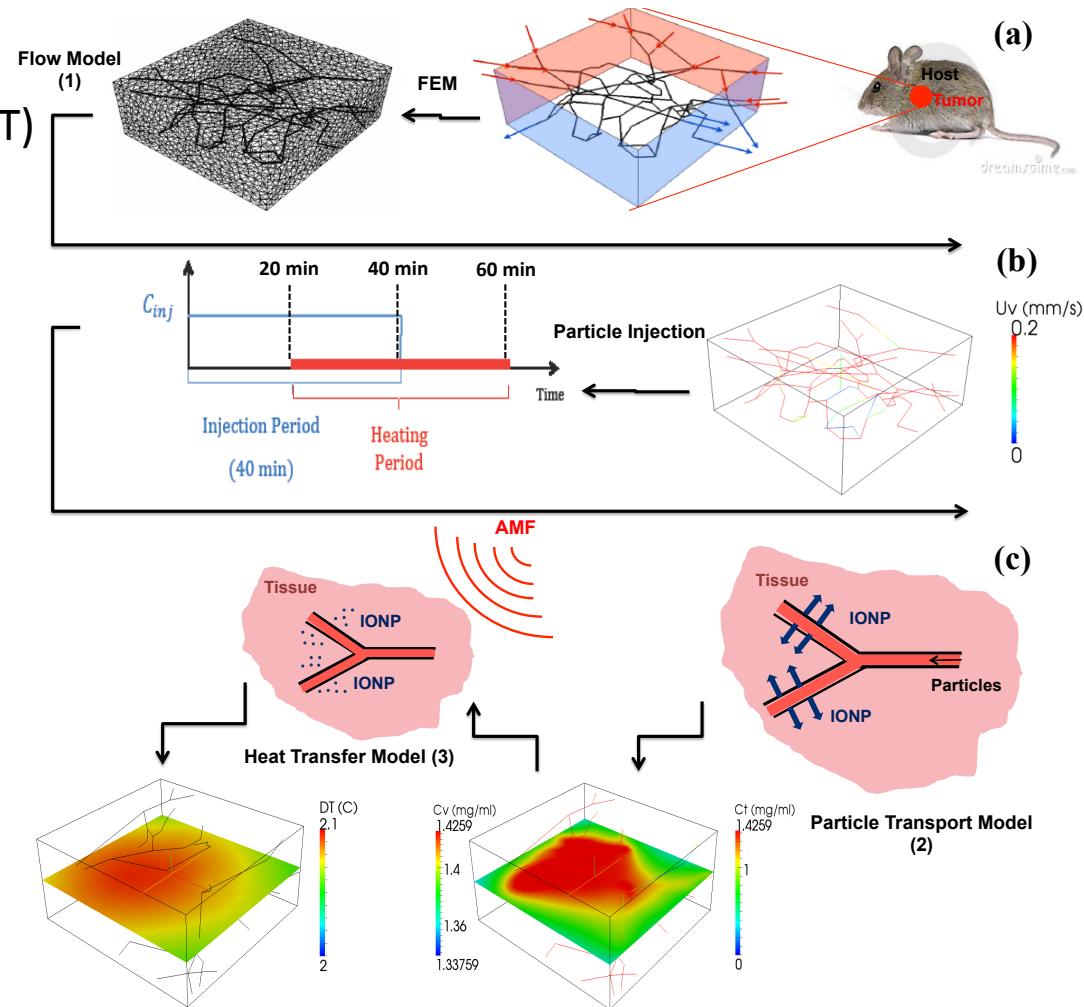
- extend the solver to mass, heat transfer and deformable vasculature
- compare the solver with Cut-FEM approach (with E. Burman UCL & Umea Univ.)

Proposal #2: application & multiscale approach

Application to tumor hyperthermia: (with C. De Falco , MOX and P. Decuzzi, IIT)

Analyze coupled effects:

- blood flow
- capillary leakage
- particle transport (*multiscale*)
- heat generation and transfer
- capillary deformation
- angiogenesis



Gone but not forgotten



D. Notaro, January 2015 - present, Ing. Mat. PoliMi,
Thesis: A New Mixed Finite Element Formulation for Modeling the Fluid Exchange between Microcirculation and Tissue Interstitium.

R. Soncini, April 2012 - December 2013. Mechanical Engineering, University of Pittsburgh. M.S.
Thesis: Parameter estimation via Bayesian inversion: theory, methods and applications.
Now at University of Virginia.

L. Cattaneo, C. Colciago, September 2009 - July 2010. MOX, Politecnico di Milano.
Thesis: Computational modeling of artificial tissue growth.
Now Post. Doctoral Fellows PoliMi and EPFL

Azzurra Porpora, July 2008 - December 2009. MOX, Politecnico di Milano.
Thesis: Numerical approximation of defective boundary conditions for hemodynamic flows.
Now at P&G Frankfurt

L. Mella e L. Nebuloni, October 2007 - December 2008. MOX/LaBS, Politecnico di Milano. M.S.
Thesis: Computational study of the interaction between blood flow and drug release from a cardiovascular stent.
Awarded with the Prize for the Best Master Thesis by the (Italian) Society of Bioengineering, 2009.