

MODEL REDUCTION

MESH ADAPTIVITY

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MOX-Modeling and Scientific Computing
Department of Mathematics, Politecnico di Milano



Milano, January 13, 2016

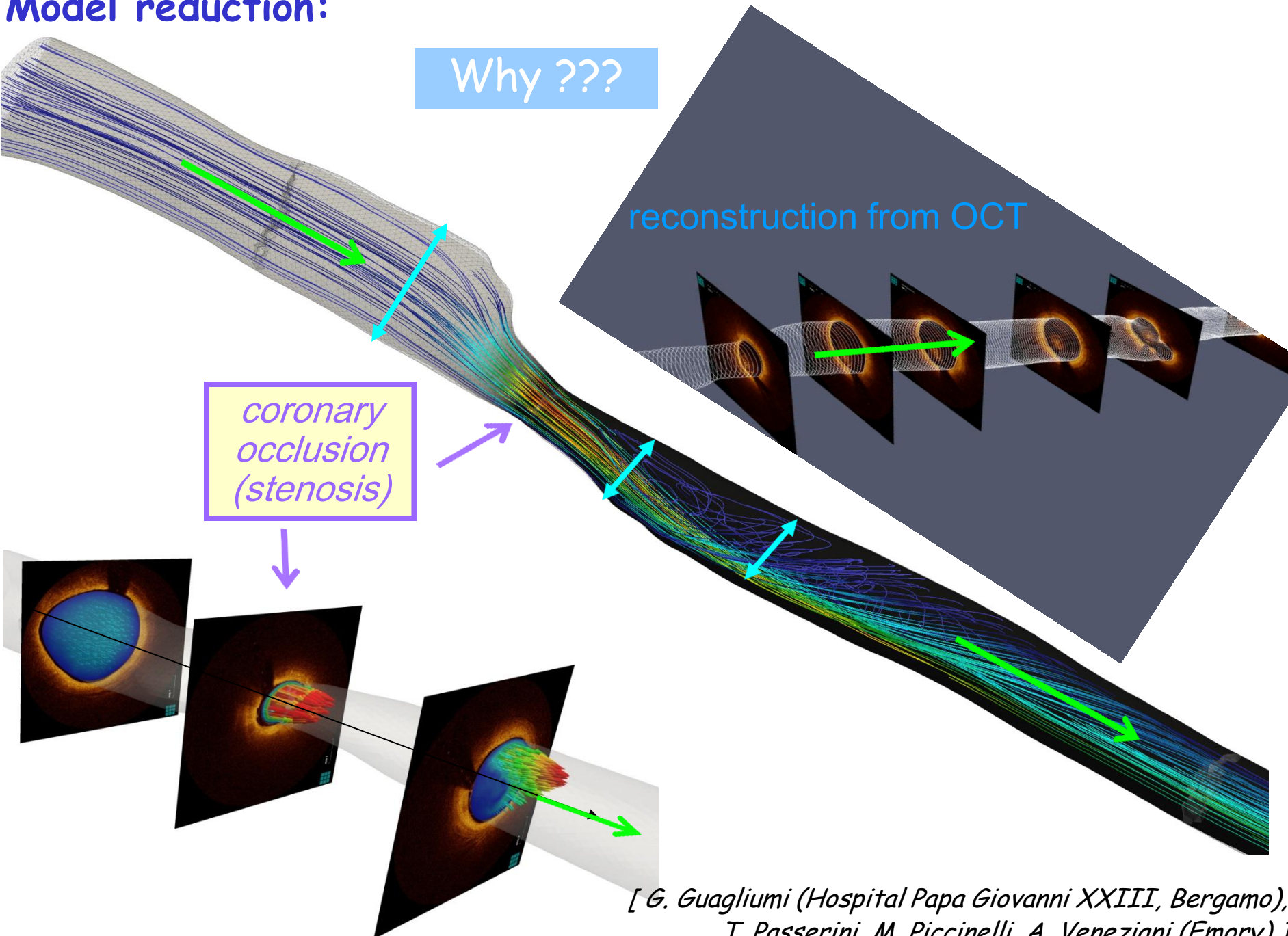
Model reduction:

Why ???

Out of many reasons: the phenomenon at hand may be only locally relevant

Model reduction:

Why ???



[G. Guagliumi (Hospital Papa Giovanni XXIII, Bergamo),
T. Passerini, M. Piccinelli, A. Veneziani (Emory)]

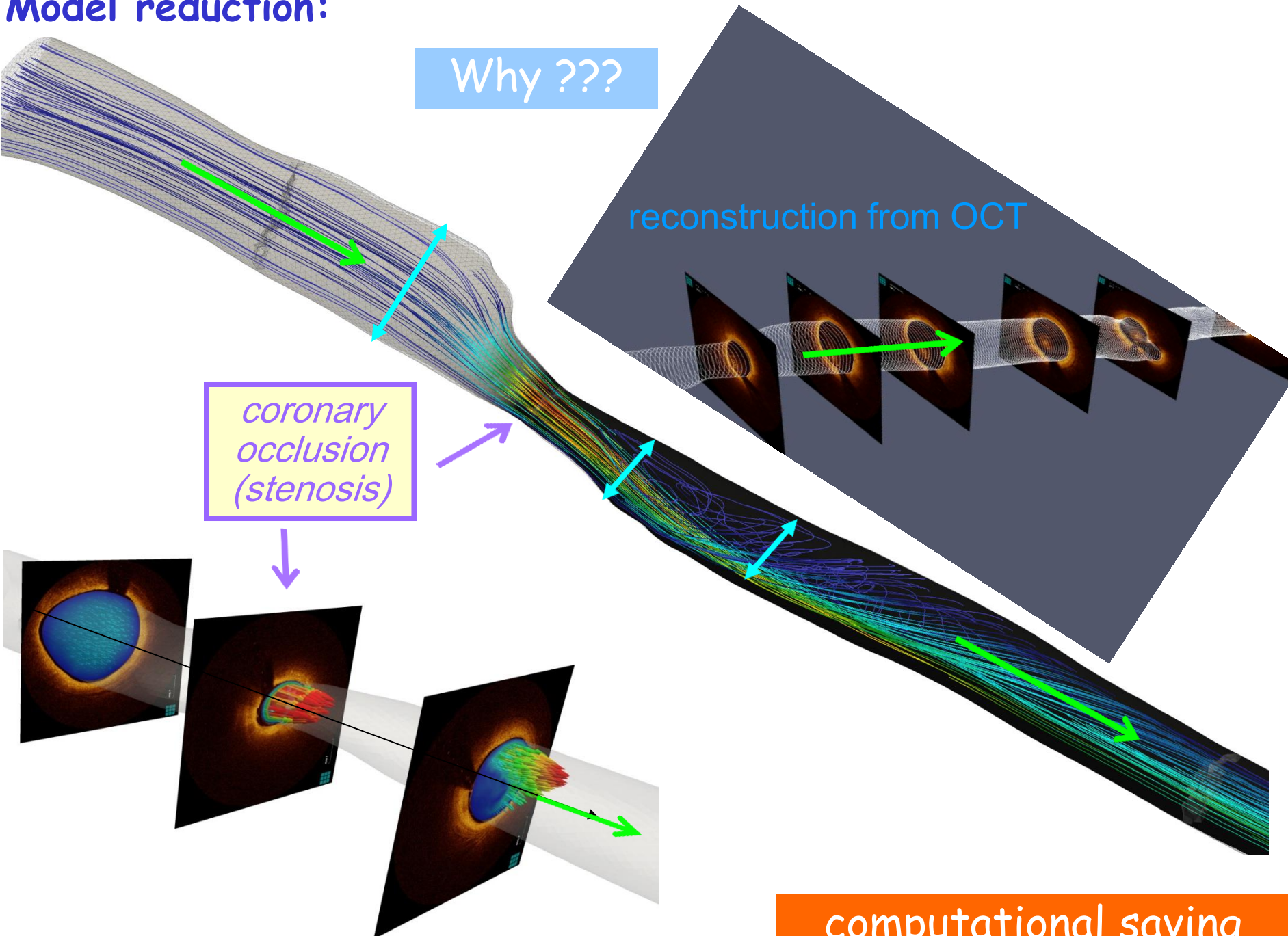
Model reduction:

Why ???

reconstruction from OCT

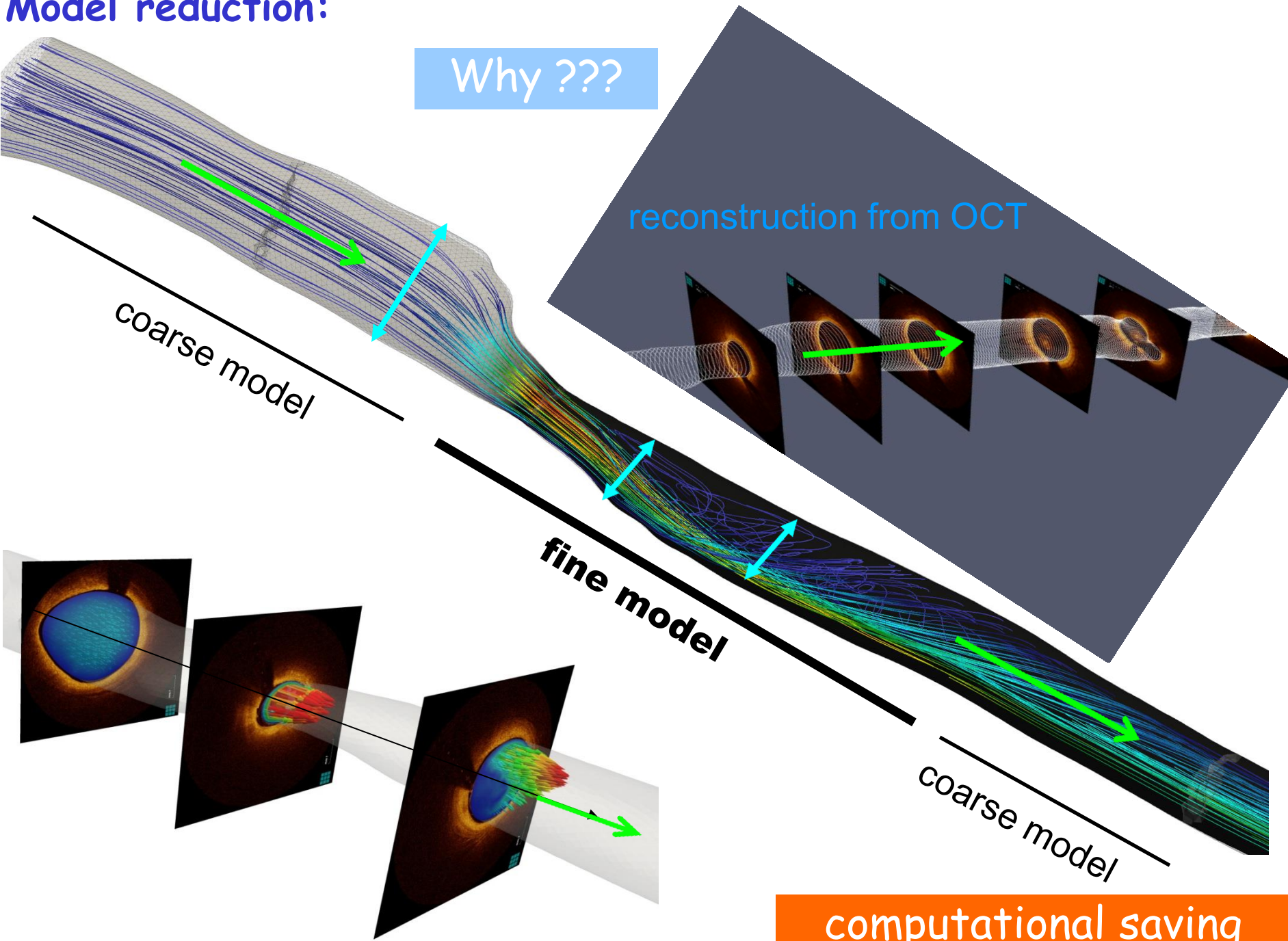
coronary occlusion (stenosis)

computational saving



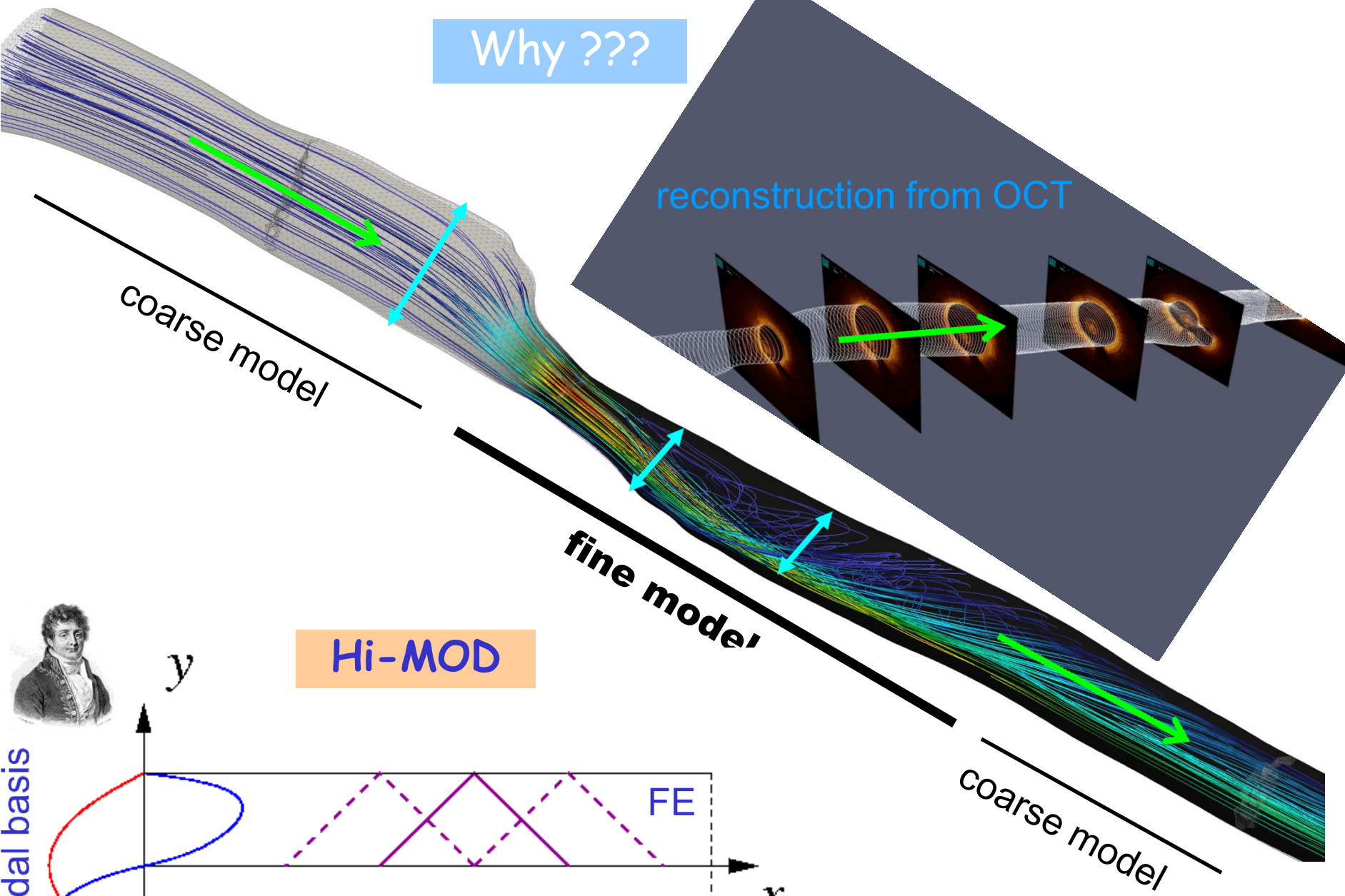
Model reduction:

Why ???

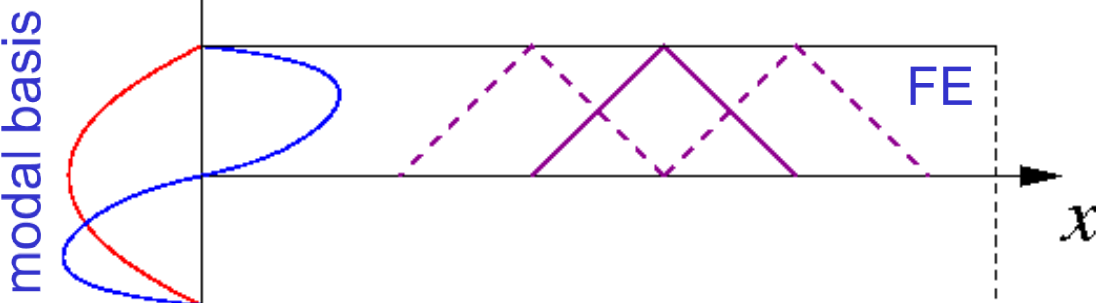


Model reduction : Hierarchical Model (HI-MOD) reduction

Why ???



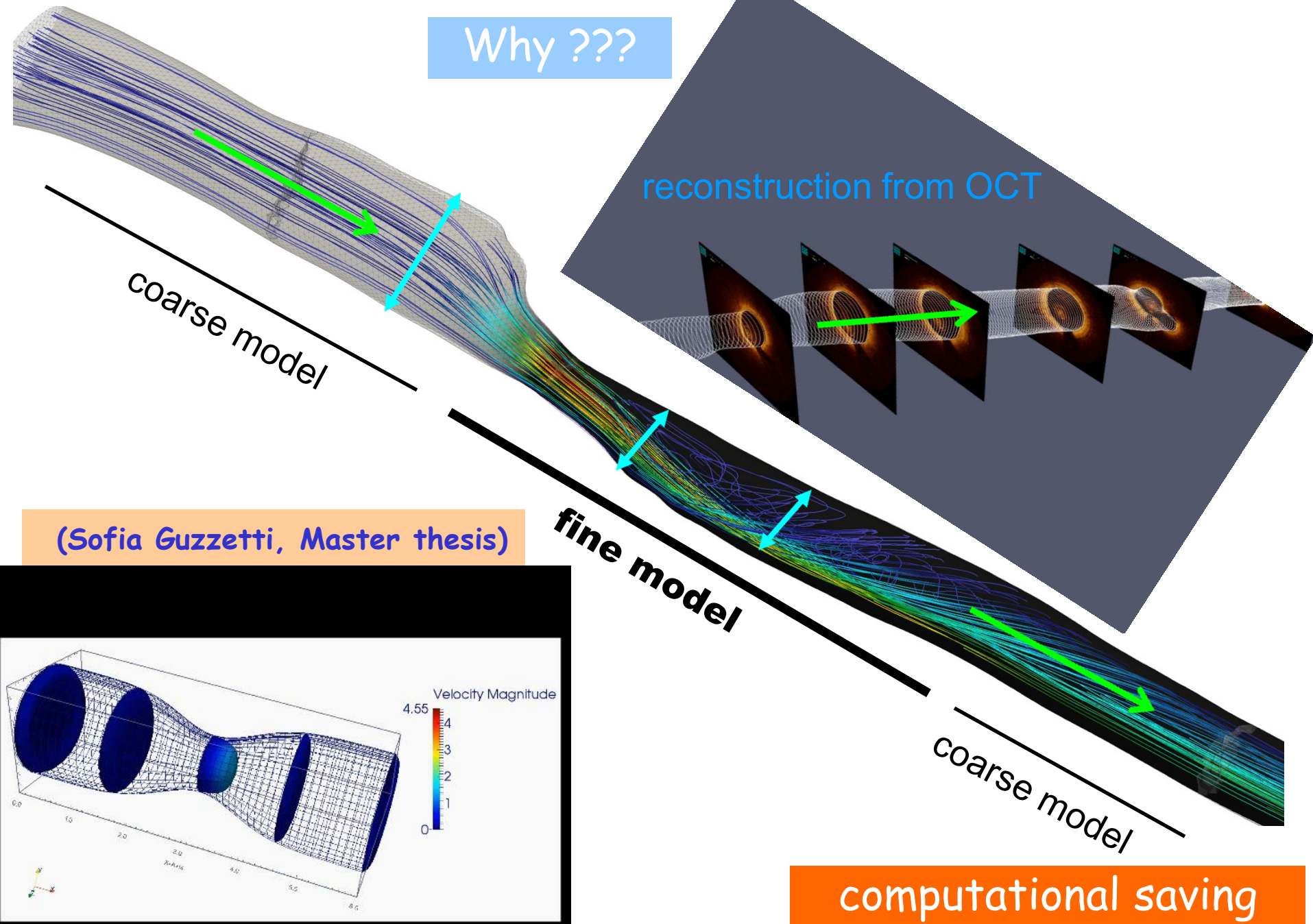
Hi-MOD



computational saving

Model reduction : Hierarchical Model (HI-MOD) reduction

Why ???



Model reduction : HIERarchical MODeL (HI-MOD) reduction

Master Theses

Alessandro Zilio (a.a. 2009-2010)

Matteo Aletti (a.a. 2012-2013)

Massimiliano Lupo Pasini (a.a. 2012-2013)

Sofia Guzzetti (a.a. 2013-2014)

Alessandro Barone (a.a. 2013-2014)

Paolo Rusconi (a.a. 2014-2015)

Collaborations

Pedro Díez

UPC, Barcelona

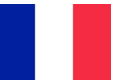
(Luca Borchini, Irene Lusetti)



Ludovic Chamoin

ENPC, Paris

(Federica Bubba)



Alessandro Veneziani

Emory University, Atlanta

(Sofia Guzzetti)



NSF Project, DMS 1419060

(July 1, 2014 - June 30, 2017)



"Hierarchical Model Reduction Techniques for Incompressible Fluid Dynamics and Fluid-Structure Interaction Problems"

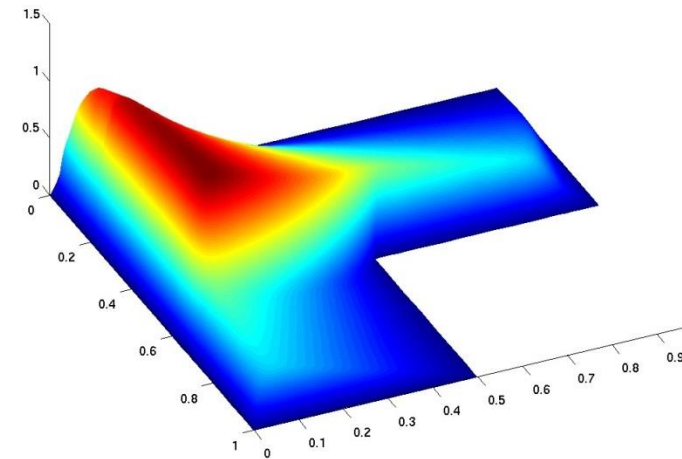
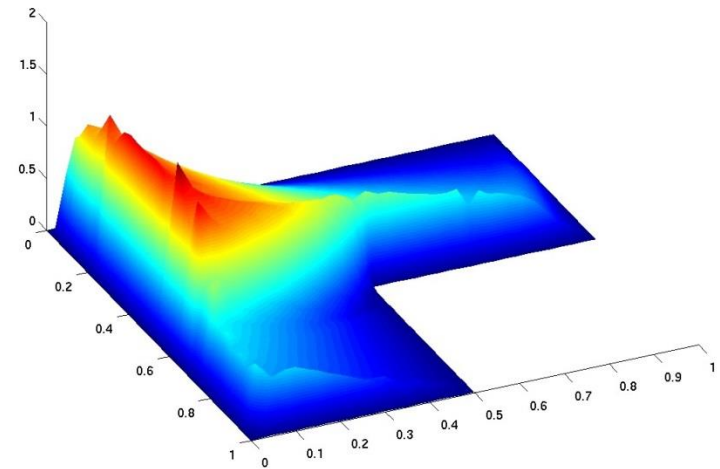
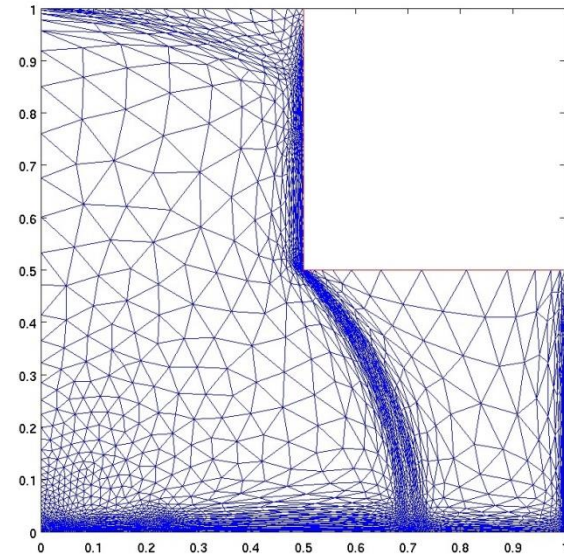
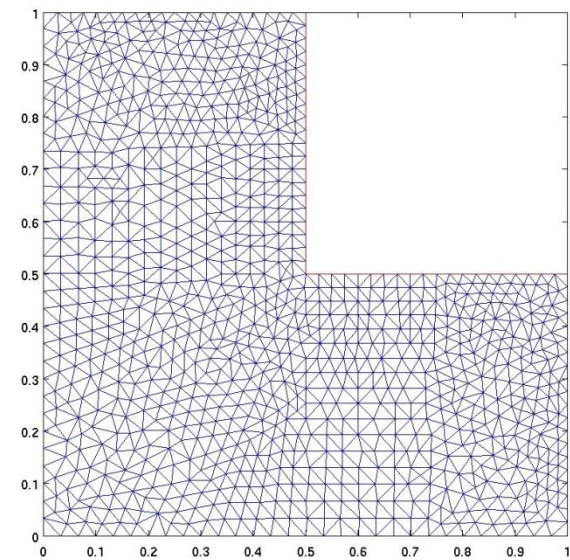
(P.I. Alessandro Veneziani)

Mesh adaptivity:

What is an adapted mesh ???

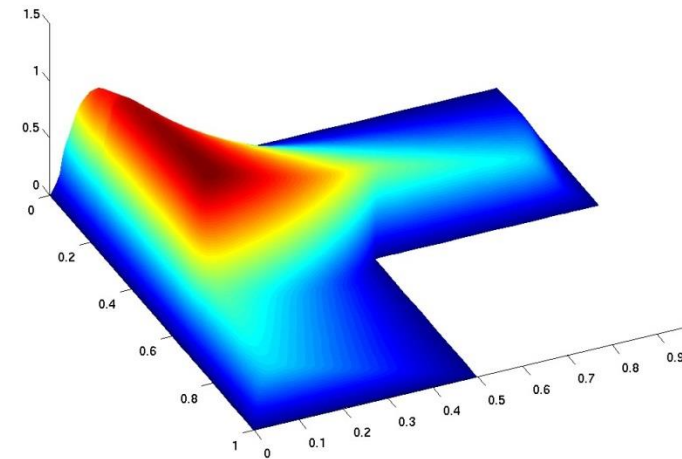
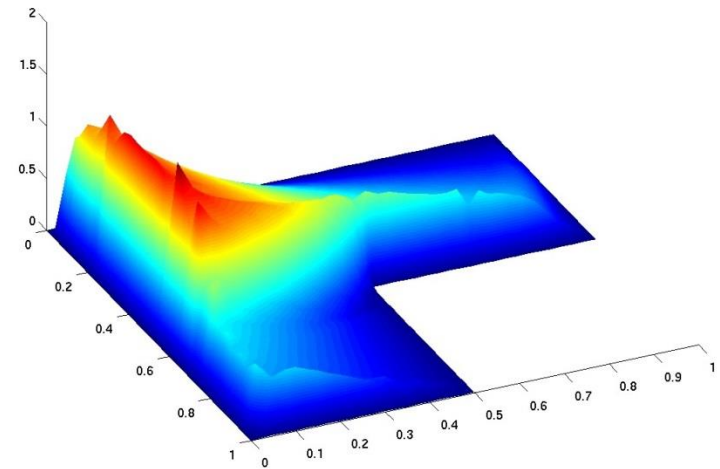
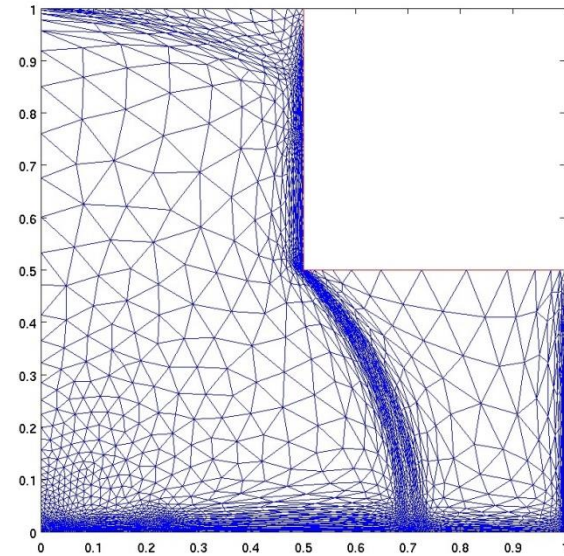
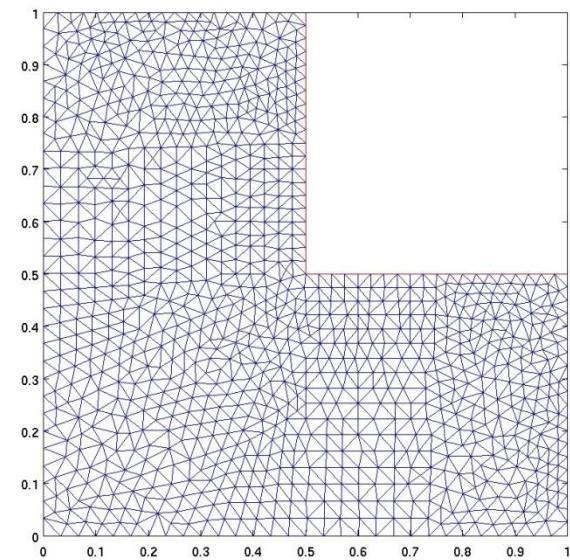
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What is an adapted mesh ???



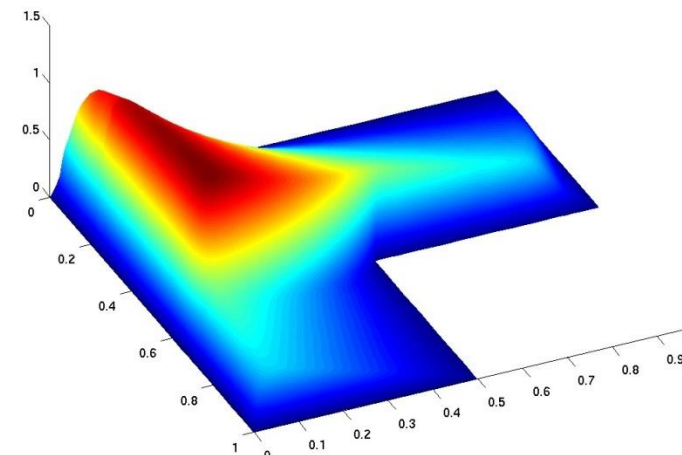
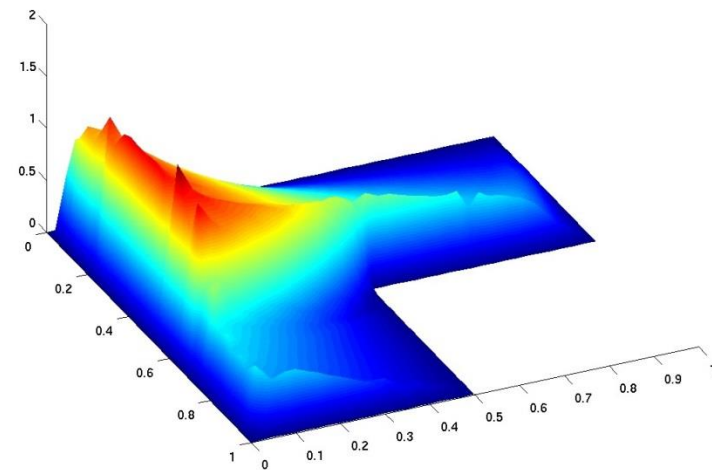
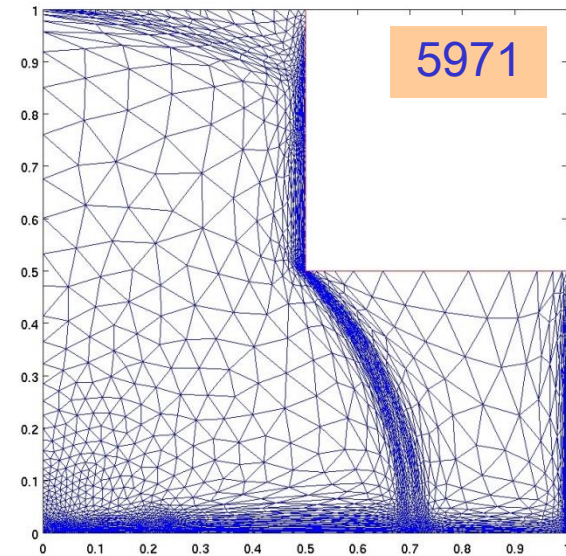
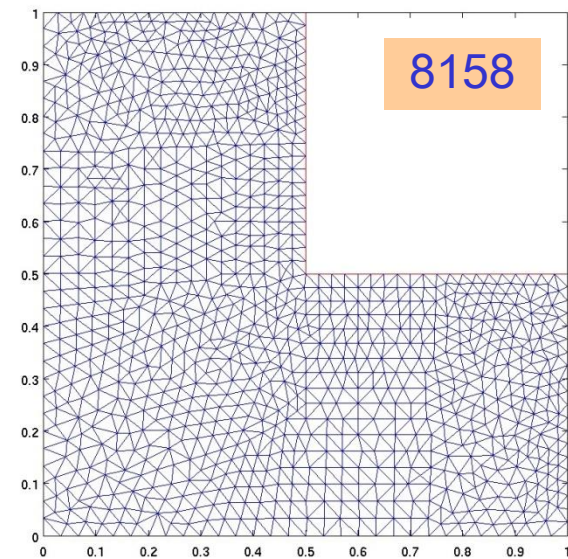
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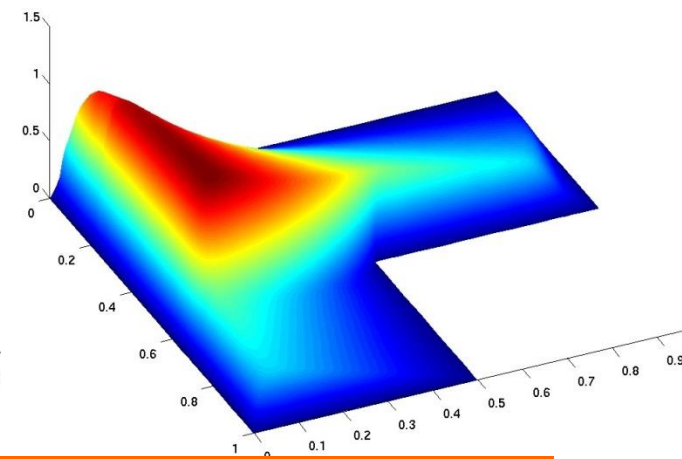
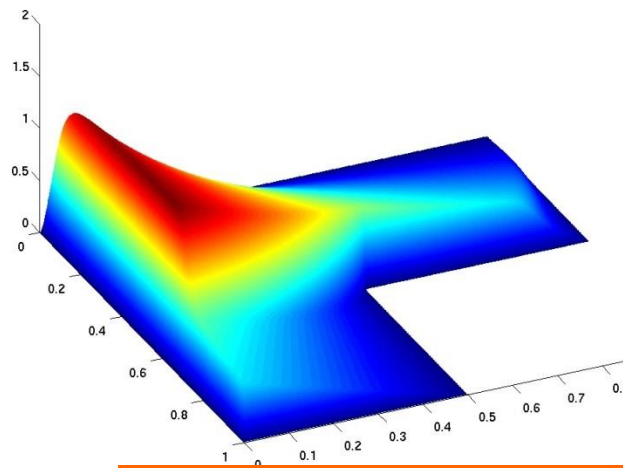
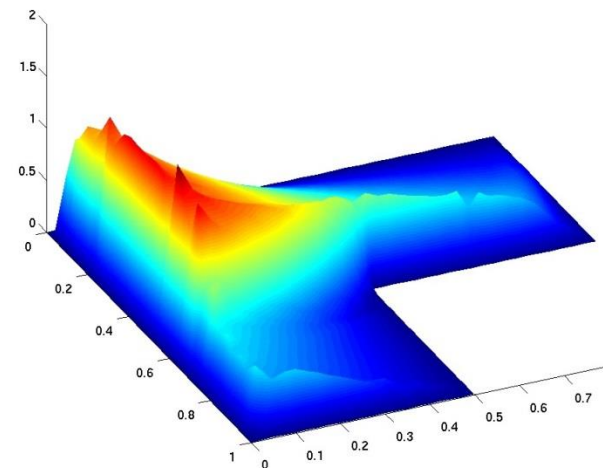
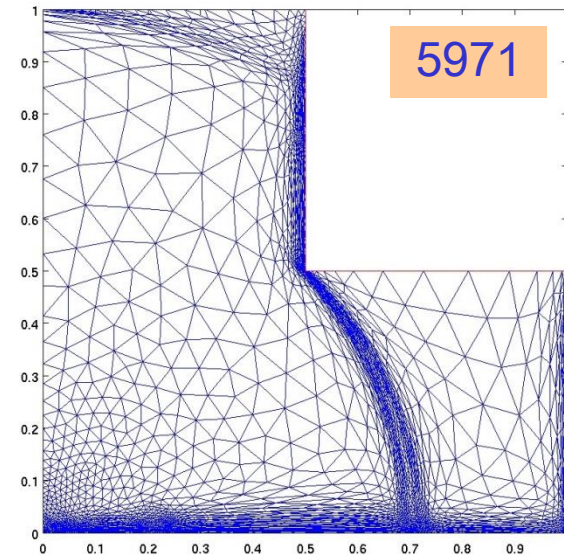
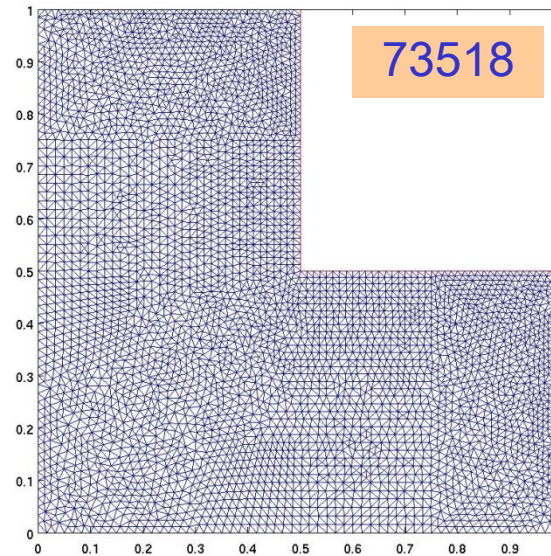
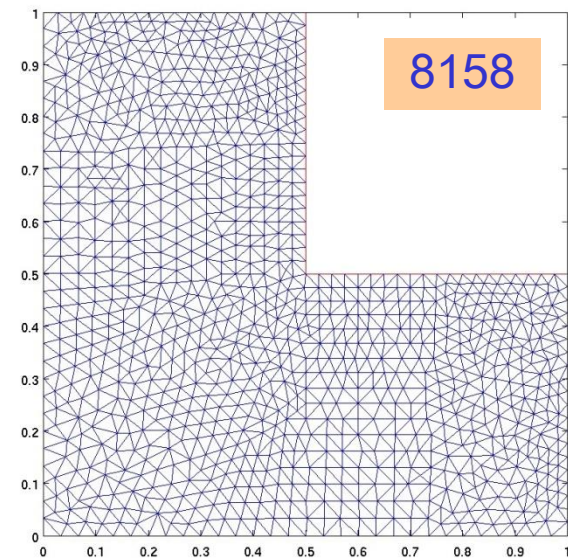


computational saving + accuracy

Why to employ an adapted mesh?

Mesh adaptivity:

What is an adapted mesh ???



computational saving + accuracy

Why to employ an adapted mesh?



Mesh adaptivity with application in:

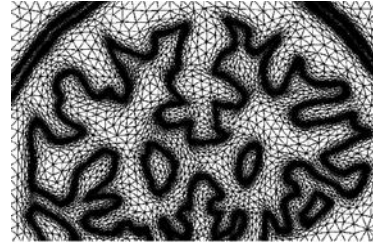
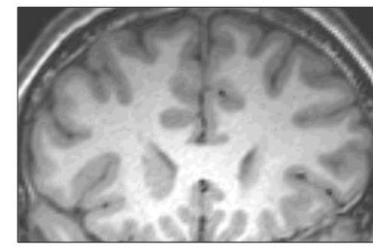
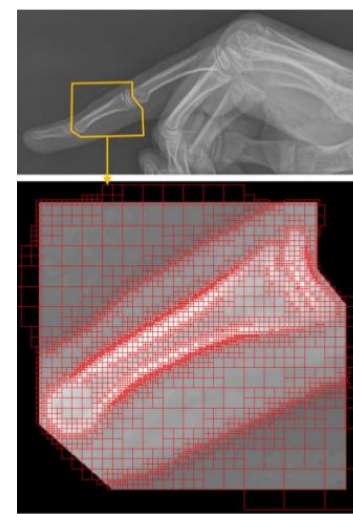
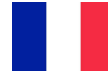
Segmentation of images

Master Theses

Nicoletta Papucci
(a.a. 2010-2011)

Collaborations

Juan José Rodenas
Univ. Politecnica Valencia
(Annagiulia Tiozzo)
Thierry Coupez
EC, Nantes



Mesh adaptivity with application in:

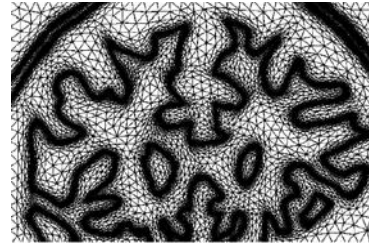
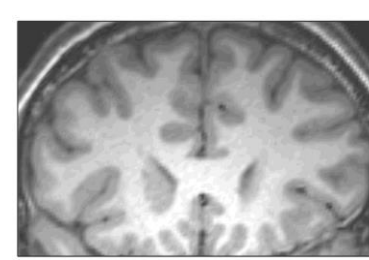
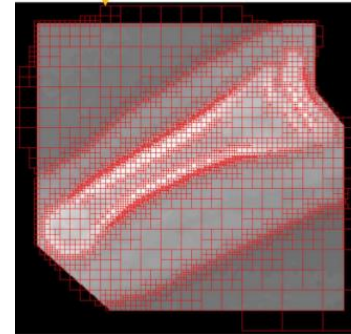
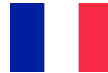
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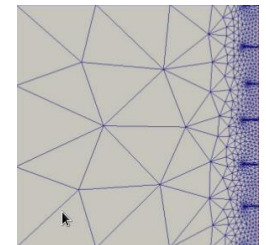
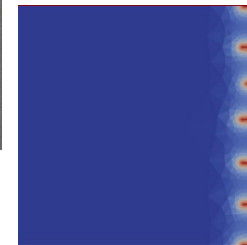
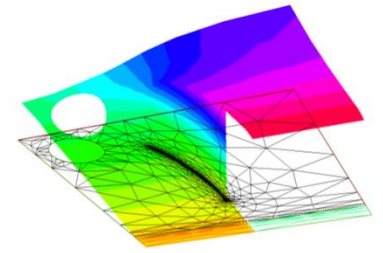
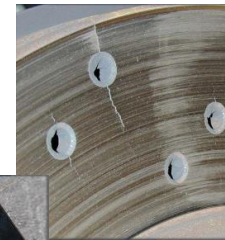
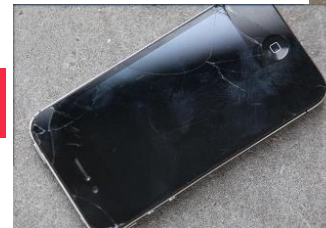
Crack propagation in brittle materials

Master Theses

Nicola Ferro
(a.a. 2014-2015)

Collaborations

Corrado Maurini
UPMC, Paris
(Stefania Fresca)



Mesh adaptivity with application in:

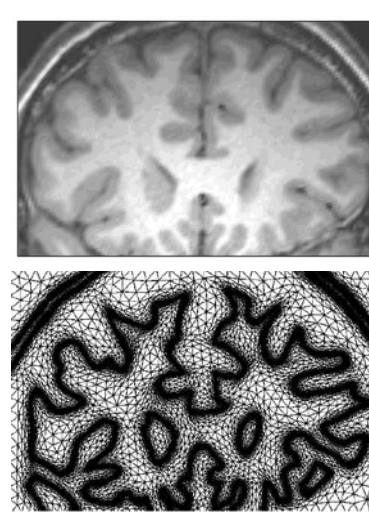
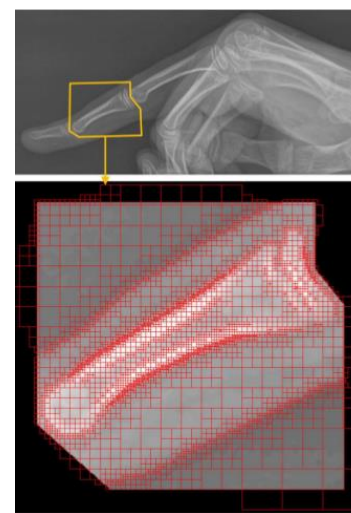
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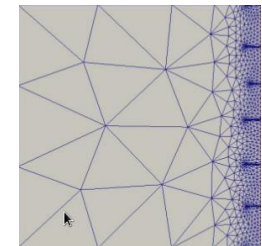
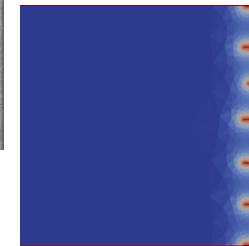
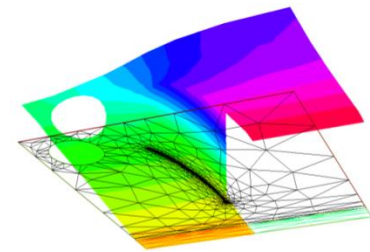
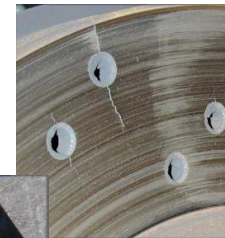
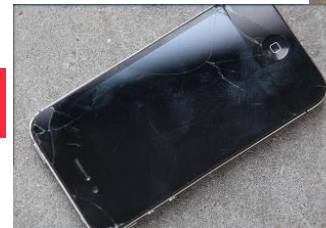
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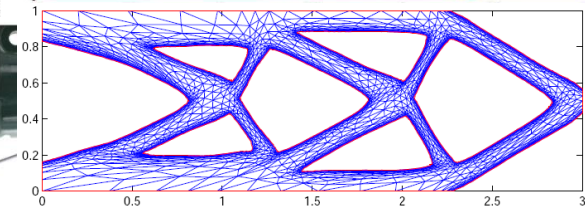
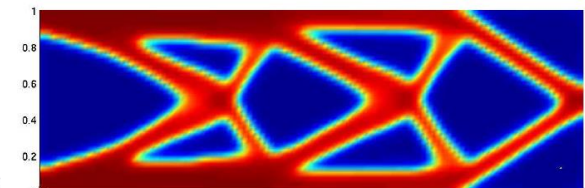
Design of structure

Master Theses

André Nicol Albini
(a.a. 2014-2015)

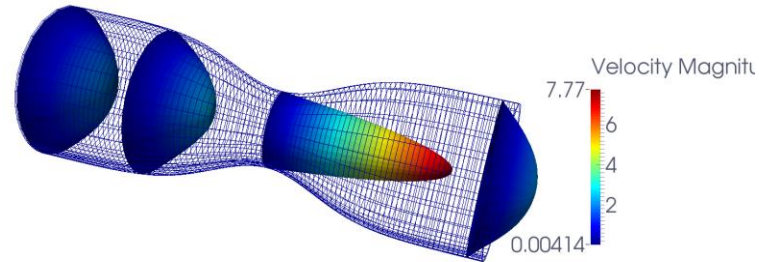
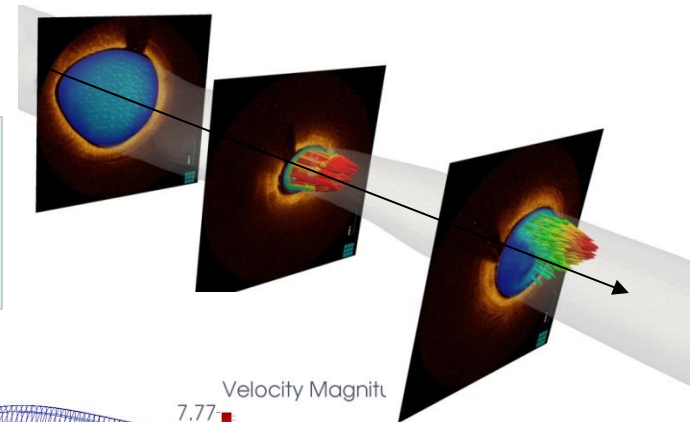
Collaborations

ThalesAlenia
Space
(Alessia Mirto)

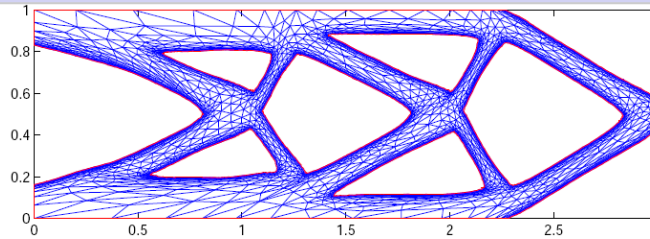
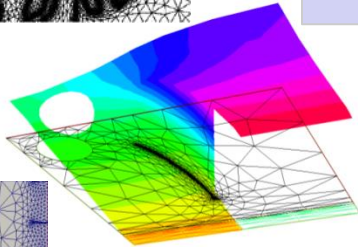
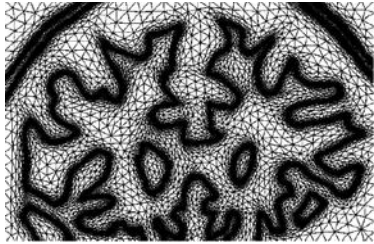
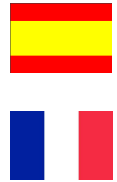


Nicola Ferro
(Ph.D. XXXI cycle)

MODEL REDUCTION



MESH ADAPTIVITY



<https://numeth.mox.polimi.it/reduction-of-the-computational-complexity/>

