



PARTNERSHIP FOR
ADVANCED COMPUTING IN EUROPE

BioCFD Tutorial: part 2

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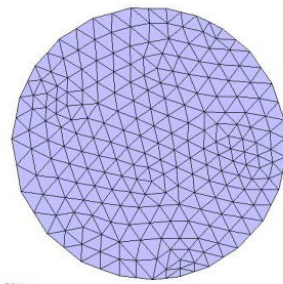
**PRACE Autumn School 2013 - Industry Oriented HPC Simulations, September 21-27,
University of Ljubljana, Faculty of Mechanical Engineering, Ljubljana, Slovenia**

CFD implementation of a carotid bifurcation model in Ansys Fluent

1. Setup a CFD unsteady state model using Fluent for the carotid mesh obtained after sensitivity analysis (Part-1)
2. Implement the following BC settings:
 - Vin: unsteady (using udf or profile)
 - Flow-split imposed (60/40): MFR-ica (using udf)
 - No-slip at the wall
3. Perform a qualitative analysis of the obtained model
4. (Optional) Implement a non-Newtonian viscous model for blood

Proposed solution

Mesh size



CCA SECTION



1.5 millions cells

Unsteady bc setup

cca=unsteady velocity inlet (flat profile) (udf)
ica=60% CCA mass-flow-inlet (unkwnon profile) (udf)
eca= stress-free pressure-outlet

Blood modeled as Newtonian incompressible

Solver:

Relaxation

Variable	Relaxation Factor
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Pressure	0.69999999
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Density	1
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Body Forces	1
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Momentum	0.30000001
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Pressure-Velocity Coupling

Parameter	Value
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Type	SIMPLE
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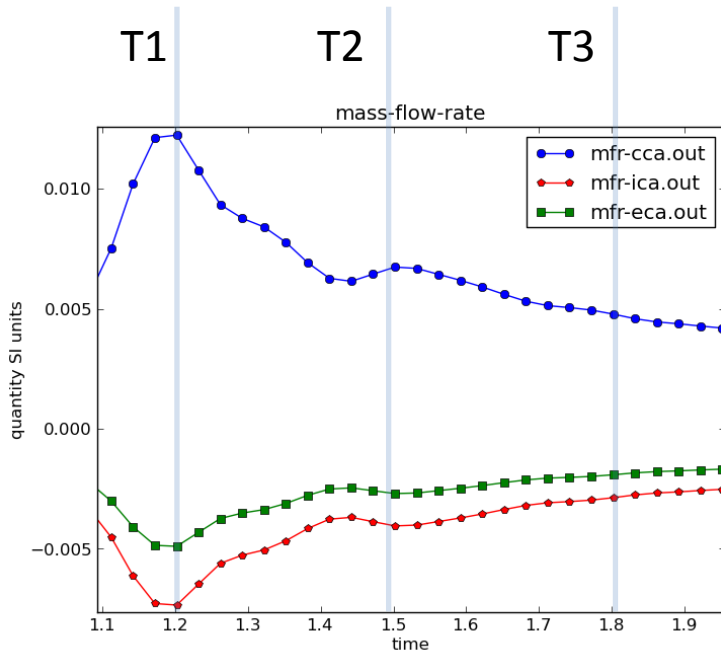
Discretization Scheme

Variable	Scheme
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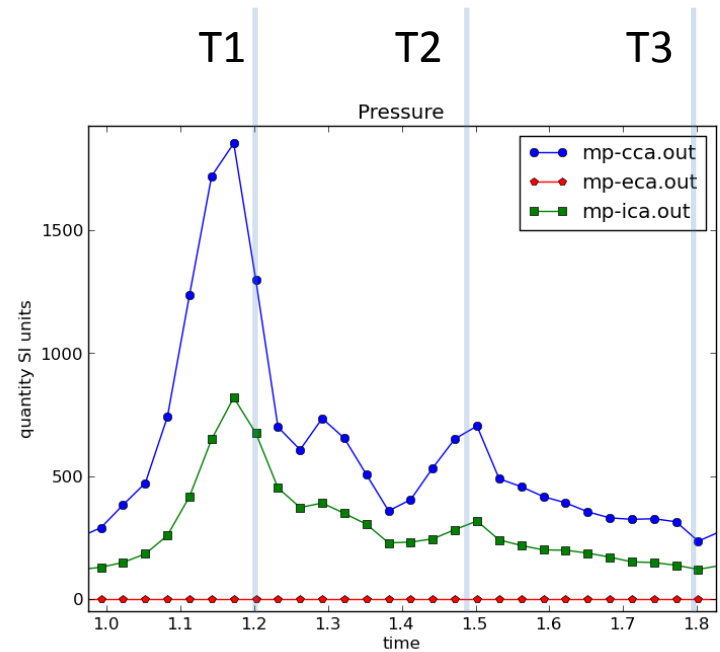
Pressure	Linear
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Momentum	Second Order Upwind
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Qualitative results: waveforms

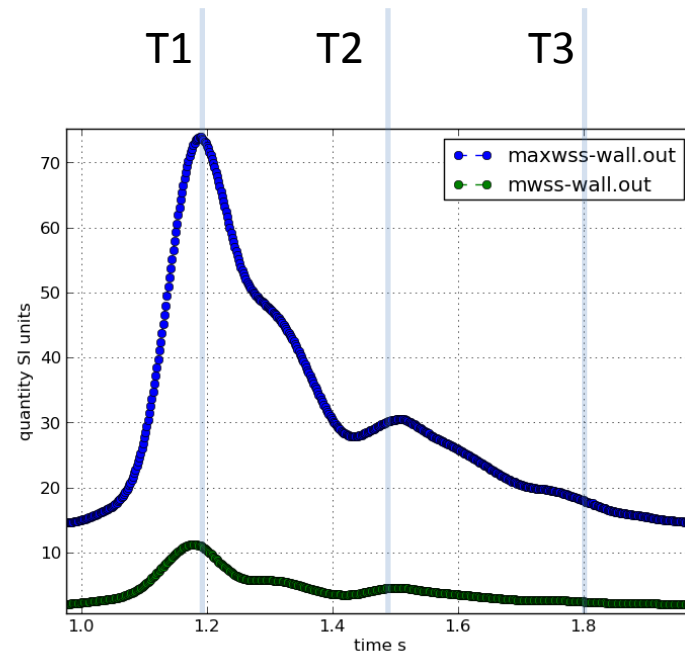


**Mass-flow-rate
in BC section
[Kg/s]**



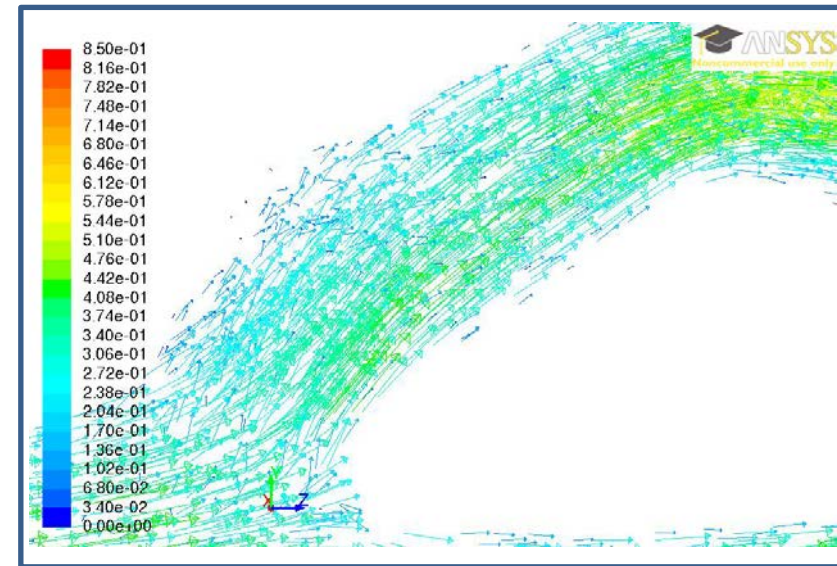
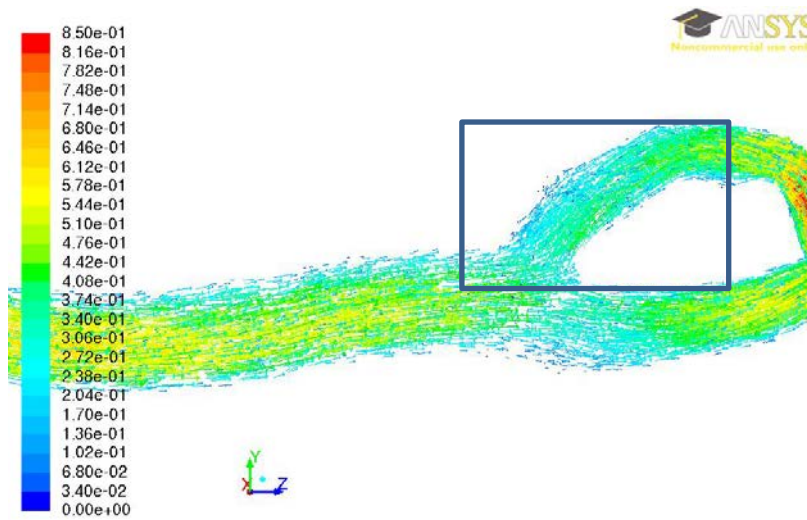
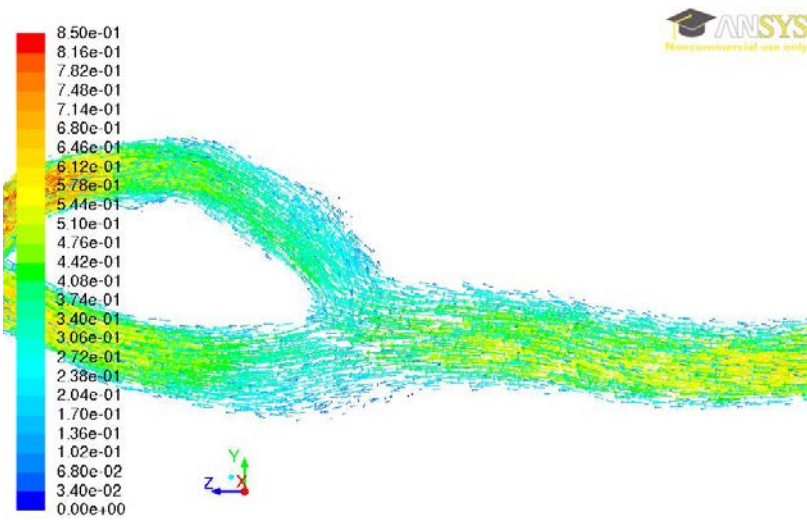
**Mean pressure
on BC faces [Pa]**

Qualitative results: waveforms

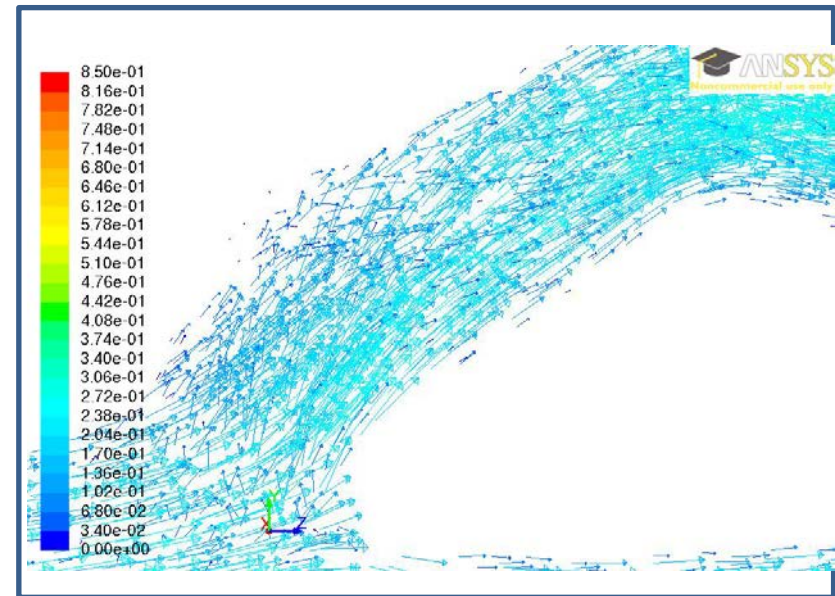
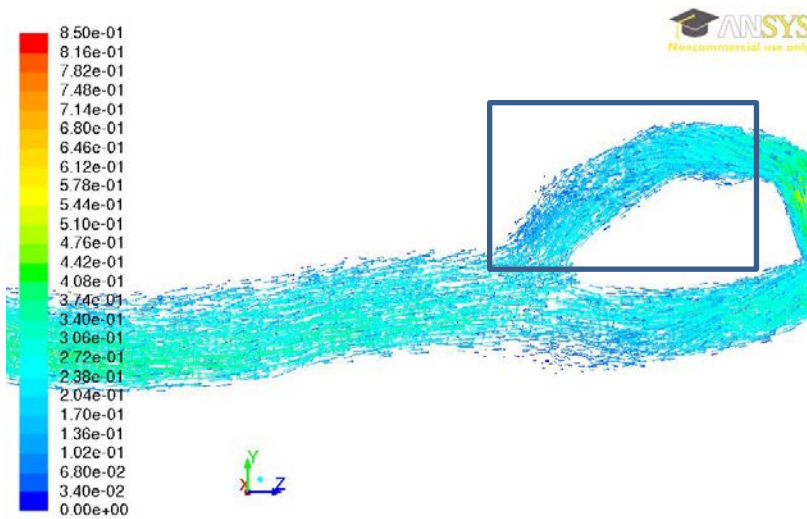
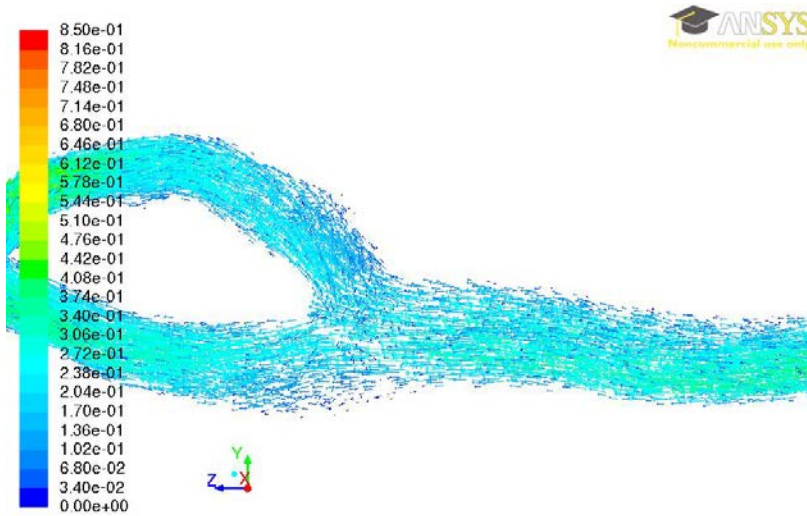


**Max and mean
WSS [Pa]**

3D velocity field: T1



3D velocity field: T2



3D velocity field: T3

