

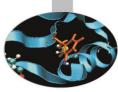
VPIV Virtual Particle Image Velocimetry

Francesco Pasqua, CINECA – HPC and innovation Unit

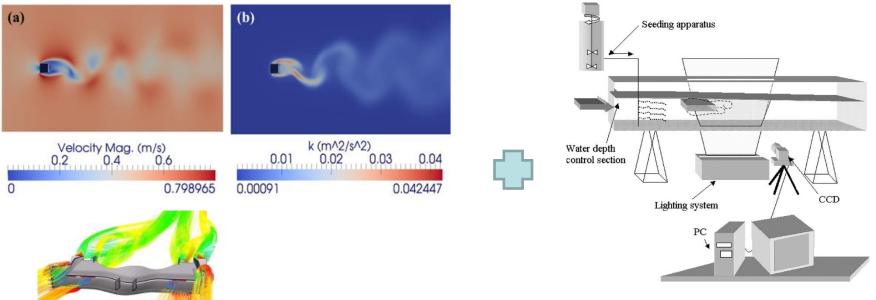
18-06-2014







VPIV – What?



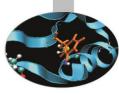


Seeded particle trajectories

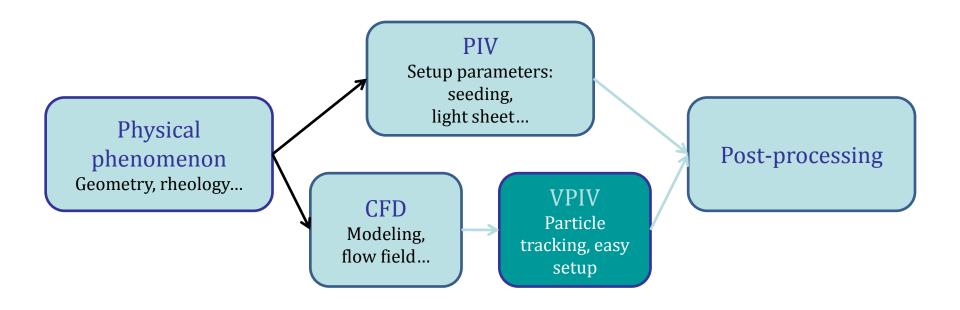






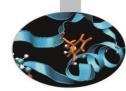


VPIV – Why? – Comparison

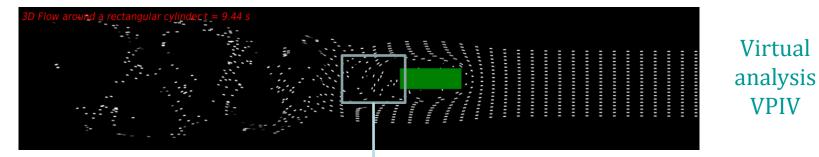








VPIV – Why? – Pre-processing



Vortex Shedding

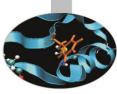


Experimental image PIV/PSV



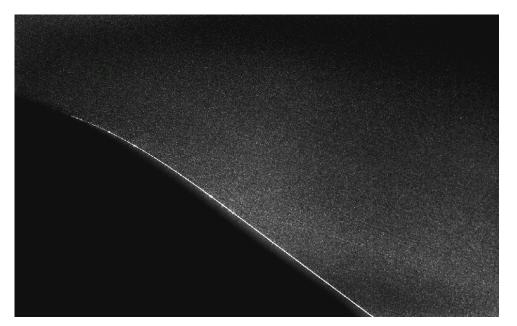






VPIV – Hypothesis

- ✓ Sufficiently small tracer particles
- ✓ Homogeneous seeding

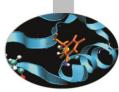


No collisions between particles

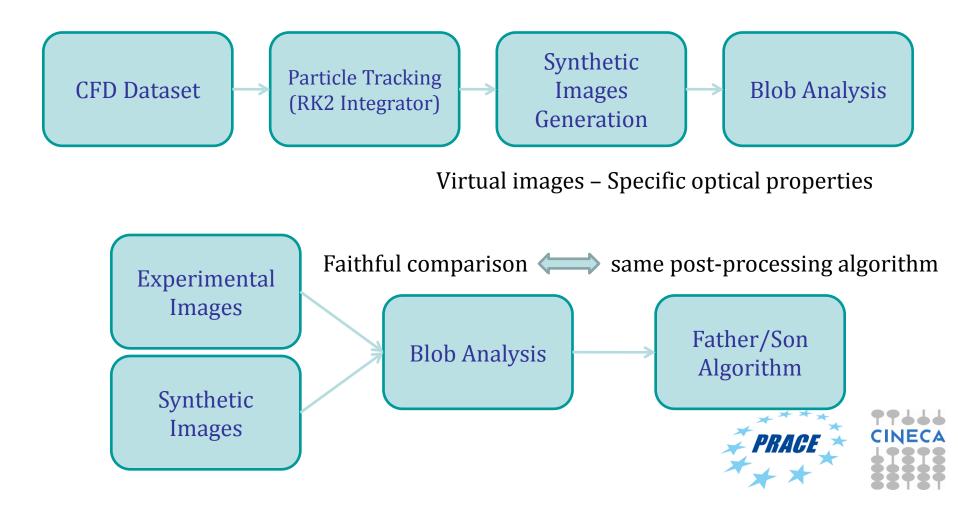
more experimental possibilities



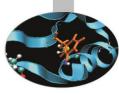




VPIV – How? – Workflow







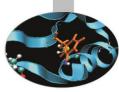
VPIV – How? – Optimisation

Pre-processing for experimental setup optimisation

- ✓ Money and time saving
 - Optimal setup for the experimental campaign







VPIV – Software GUI

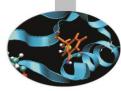
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ile					
Synthetic data creation S.I.G.	⊻ideo creation	<u>B</u> lob analysis	<u>R</u> esults visualisation		
Image <u>W</u> idth (pixels)	2000			Pixel/real ratio in x-dim	-1000.0
Image <u>H</u> eight (pixels)	420 🗘			Pixel/real ratio in y-dim	1000.0
x-left coordinate (real units)	2.00			Particle <u>d</u> iameter (pixels)	1.00 🔪
x-right coordinate (real units)	0.00			<u>O</u> bject distance	1.00 🗘
y-bottom coordinate (real units) 0.00 🔶			Image distance	1.00 🔷
y-top coordinate (real units)	0.42 🗘			<u>M</u> agnification	1.00 📮
z-min coordinate (real units)	0.00			Laser z position	0.01 ᅷ
z-max coordinate (real units)	1.00 📮			Laser thickness	0.02 🖕
✓ Advanced Parameters					
Laser sheet type	gaussian ≎			CCD Saturation level	1.00 🖕
Projection type	znormal \$			CCD Background type	uniform 😂
CCD Fill ratio x	0.75 🗘			CCD Background mean level	0.00
CCD Fill ratio y	0.75 🗘			CCD Background standard noise	0.00 🗘
Select <u>P</u> roject Name					Run S.I.G.







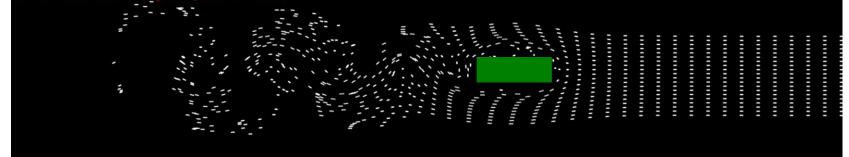


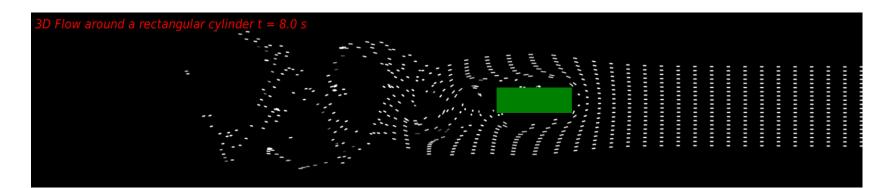


VPIV – Images from CFD

2D Flow around a rectangular cylinder t = 8.0 s

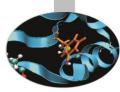
3D







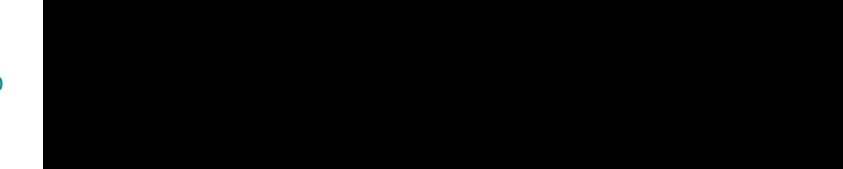




VPIV – Videos from CFD

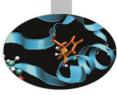












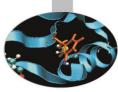
VPIV – Didactical

- ✓ Didactical support for PIV/PSV introduction
- ✓ Comparison of case studies (numerical and experimental)

Easy understanding of complex flow fields







VPIV – Acknowledgements

Thank you for your kind attention!

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The synthetic images used in the present work were generated using the EUROPIV Synthetic Image Generator which is described in B. Lecordier, J. Westerweel. The EUROPIV Synthetic Image Generator (S.I.G.). Proceedings of the EUROPIV 2 Workshop on Particle Image Velocimetry. M. Stanislas, J. Westerweel, J. Kompenhans Editors. Springer Verlag, 2004.

