Ecinads-D7.1b: Specification of industrial test cases

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Abstract

Key words: Large Eddy Simulation, Computational Fluid Dynamics

1 Pompe rotative PCM

The steady flow through a pump is computed. The geometry is depicted in Figure 1 and is similar to a duct with an inflow and an outflow section. The rotor blades are considered fixed. When partitioned in slices normal to flow, the error correction slowly propagate. Further, the flow involves thin boundary layers. In the proposed calculations the mesh involves 2M cells and is partitioned on 40 processors. Figure 2 and Table 1 compare the efficiency of a single implicit pressure projection step with a) a pure RAS-ILU preconditioner and b) the same combined with Deflation. With the second option, convergence of the projection linear solver is 12 times faster in terms of iterations and the gain in efficiency is about a factor of 9.7 for the projection phase and 8.5 for the overall calculation.

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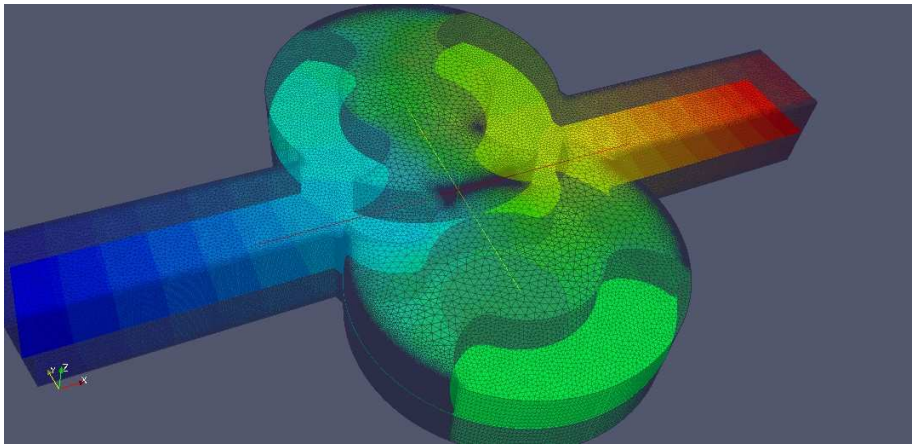


Fig. 1 *Mesh and pressure in a pump (Decomposition 4). Courtesy of PCM.*

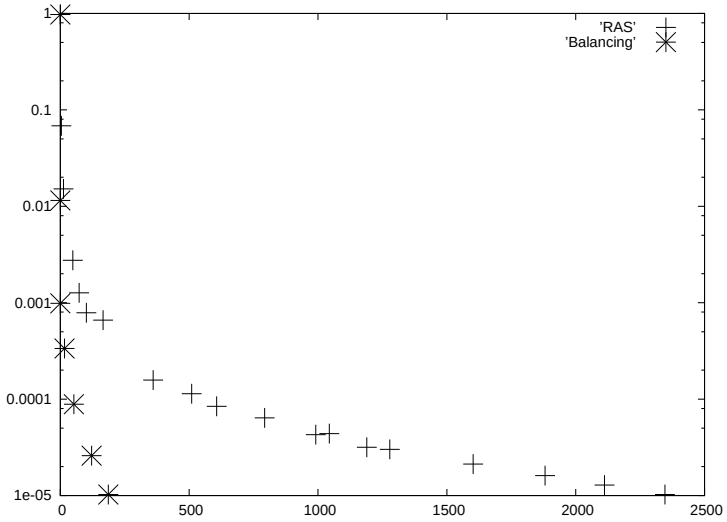


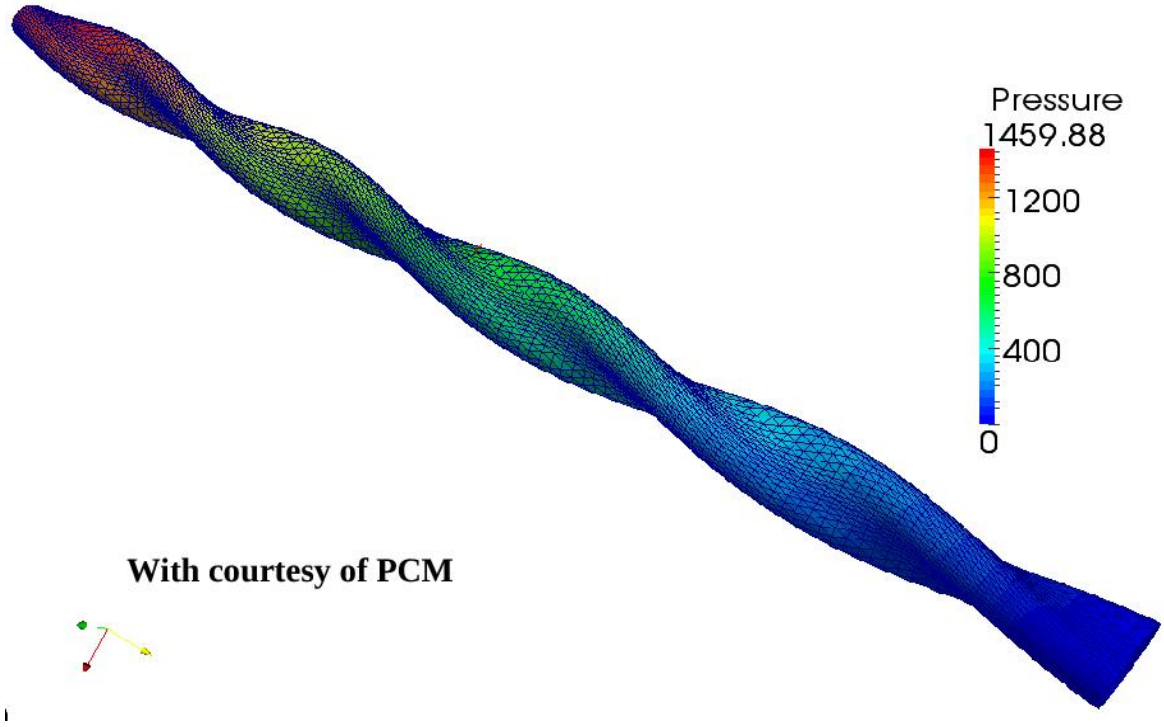
Fig. 2 *Incompressible flow through a pump.Comparison between RAS and two-level RAS solution algorithms (Decomposition 4). Residuals (normalised at 1 at first iteration) as functions of iterations.*

Table 1 *Incompressible flow through a pump, comparison of # of iterations for convergence*

Type of preconditioner M^{-1}	# sub-domains	Iterations	CPU
RAS-ILU	40	2364	291 sec.
Deflated-RAS-ILU	40	186	30 sec.

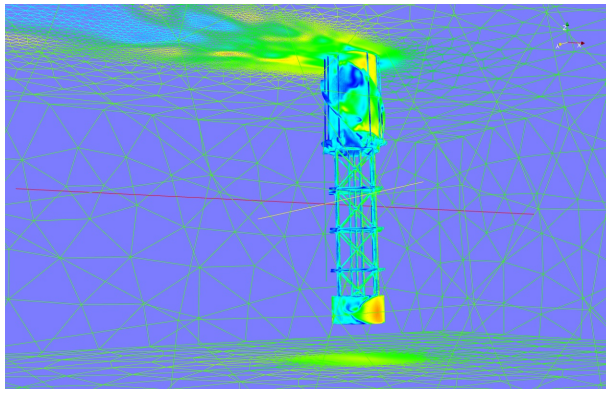
2 Pompe capsuleique PCM

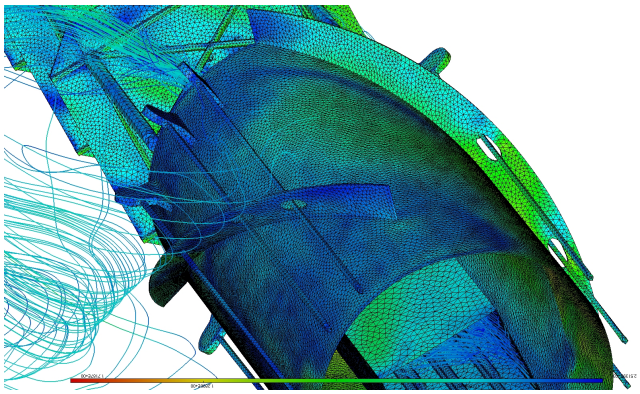
Voir figure. Une difficulté importante (non visible sur la figure est l'extrême étirement des mailles normalement à la peau extérieure.

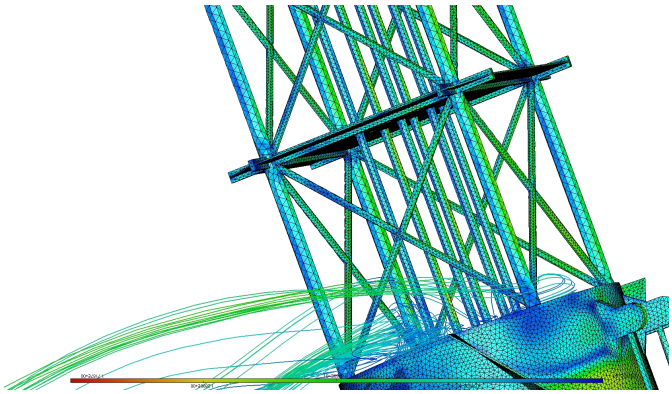


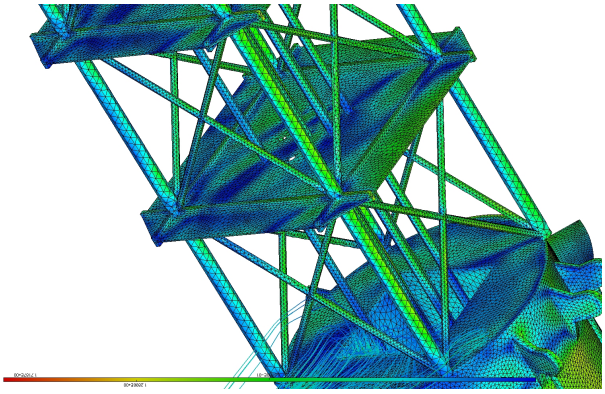
3 Géometrie complexe de plateforme pétrolière de type “spar”

Cette géométrie calculée en [1] compte 2M noeuds, Voir les figures.









4 Acknowledgements

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References

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