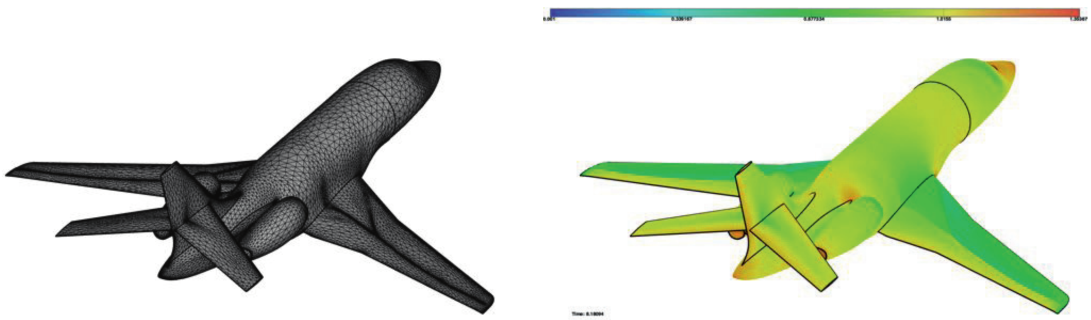

Fig. 7. Final adapted surface mesh on the falcon geometry (left) and density iso-values (right).

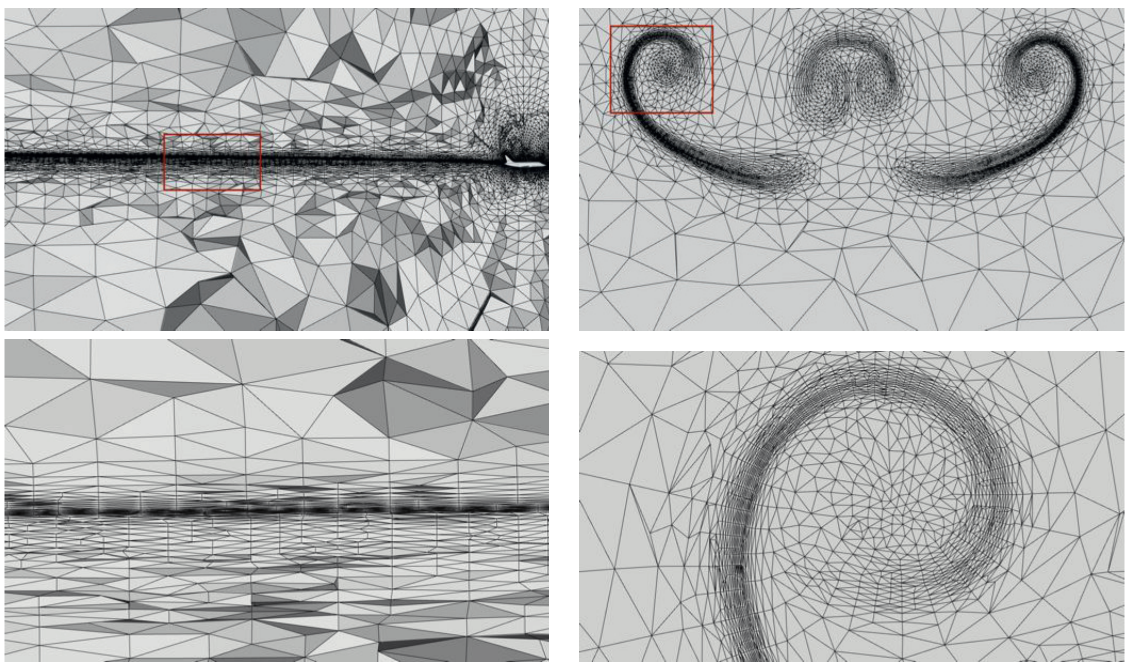

Fig. 8. Cuts in the final adapted volume mesh showing the aligned anisotropic elements: in the wake (top left), the vortex 100m behind the falcon (top right). Closer view in the red rectangles of the wake (bottom left) and the vortex (bottom right)

We now consider the example of a dam break on a rectangular obstacle. In this simulation, the compressible bi-fluid solver ANANAS©[17] is used. The error estimate is based on a level-set metric in order to capture and predict accurately the interface between the water and the air. The total CPU time for a physical time of $15s$ is $36h$ for the fully unstructured and $24h$ for the Cartesian approach. Both simulations were run on 4-cores of an Ivy-Bridge i7 at $3.4Ghz$. We observe in Figure 10 the dynamic of the flow. As the metric-orthogonal approach tends to insert less points (especially in the transverse direction), the CPU time is lower than the classical anisotropic approach. The distribution of the dihedral angles for the standard and metric-orthogonal approach are reported in Figure 9 (right) for time $0.85s$. The histogram shows that the angle distribution is centered around small angles and right angle whereas a uniform distribution is observed for the standard approach. Some cuts in the volume mesh are reported in Figure 11 at different times. It shows how the mesh around the interface is locally structured and how the edges are automatically aligned.