TILDA

Project ID: 635962
Funded under: H2020-EU.3.4.

Towards Industrial LES/DNS in Aeronautics – Paving the Way for Future Accurate CFD

From 2015-05-01 to 2018-12-31, closed project

Project details

<table>
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<th>Total cost:</th>
<th>Topic(s):</th>
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<tr>
<td>EUR 3 048 742,50</td>
<td>MG-1.1-2014 - Competitiveness of European Aviation through cost efficiency and innovation</td>
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<tr>
<td>EU contribution:</td>
<td>Funding scheme:</td>
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<tr>
<td>EUR 2 706 241,75</td>
<td>RIA - Research and Innovation action</td>
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<tr>
<td>Coordinated in:</td>
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<td>Belgium</td>
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Objective

The ability to simulate aerodynamic flows using CFD methods has progressed rapidly over the last decades and has given rise to a change in design processes in aeronautics already. But more improvement is necessary to overcome the (still) existing lack in confidence in CFD usage, based on turbulence modelling. The TILDA project will offer methods and approaches combining advanced and efficient high-order numerical schemes (HOMs) with innovative approaches for LES and DNS in order to resolve all relevant flow features on tens of thousands of processors in order to get close to a full LES/DNS solution for 1 billion degrees-of-freedom (DOF) not exceeding turn-around times of a few days.

The TILDA project will provide both an improved physical knowledge and more accurate predictions of non-linear, unsteady flows – near borders of the flight envelope - which will directly contribute to an enhanced reliability. The main highly innovative objectives, targeting at industrial needs read:

• Advance methods to accelerate HOM for unsteady turbulence simulations on unstructured grids.
• Advance methods to accelerate LES and future DNS methodology by multilevel, adaptive, fractal and similar approaches on unstructured grids.
• Use existent large scale HPC networks to enable industrial applications of LES/DNS close(r) to daily practice. Compact high-order methods offer a very high ratio between computational work per DOF combined to a low data dependency stencil, making these methods extremely well adapted for shared-memory parallel processors, and allow for efficient redistribution over an increased number of processors.
• Provide grid generation methods for HOM on unstructured grids with emphasis on valid curvilinear meshes for complex geometries, and accounting for mesh and solution quality.
• Provide suitable I/O and interactive co- and post-processing tools for large datasets.
• Demonstration of multi-disciplinary capabilities of HOM for LES in the area of aero-acoustics.

Related information

Report Summaries

Periodic Reporting for period 1 - TILDA (Towards Industrial LES/DNS in Aeronautics – Paving the Way for Future Accurate CFD)
Coordinator

NUMERICAL MECHANICS APPLICATIONS INTERNATIONAL SA
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EU contribution: EUR 445 000

Activity type: Private for-profit entities (excluding Higher or Secondary Education Establishments)
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EU contribution: EUR 240 000

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EU contribution: EUR 262 906

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EU contribution: EUR 250 000

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EU contribution: EUR 231 628,75
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Activity type: Research Organisations
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