

PROJECT

TILDA

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

Funding: European (Horizon 2020)

Duration: May 2015 - Dec 2018

Status: Complete

Total project cost: €3,048,743

EU contribution: €2,706,242



Call for proposal: H2020-MG-2014_TwoStages

[CORDIS RCN : 193362](#)

Objectives:

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.

Parent Programmes:

[H2020-EU.3.4. - Horizon 2020: Smart, Green and Integrated Transport](#)

Institute type: Public institution

Institute name: European Commission

Funding type: Public (EU)

Lead Organisation:

Numerical Mechanics Application International

Address:

5 Avenue Franklin Roosevelt
1050 BRUSSELS

Belgium

Organisation Website:

<http://www.numeca.com>

EU Contribution: €445,000

Partner Organisations:

Universita' Degli Studi Di Bergamo

Address:

Via Salvecchio 19
24129 Bergamo
Italy

EU Contribution: €250,000

Imperial College Of Science Technology And Medicine

Address:

Exhibition Road, South Kensington
LONDON
SW7 2AZ
United Kingdom

Organisation Website:

<http://www.imperial.ac.uk>

EU Contribution: €231,629

Safran Sa

Address:

2 Boulevard Du Gal Martial Valin
75015 Paris
France

Organisation Website:

<http://www.safran.com>

EU Contribution: €199,063

Universite Catholique De Louvain

Address:

Place De L Universite 1
1348 Louvain La Neuve
Belgium

EU Contribution: €262,906

Office National D' Etudes Et De Recherches Aérospatiales

Address:

29, avenue de la Division Leclerc
BP72 CHÂTILLON CEDEX
France

Organisation Website:

<http://www.onera.fr>

EU Contribution: €316,256

Deutsches Zentrum Fr Luft Und Raumfahrt E.v**Address:**

Linder Hoehe
51147 KOELN
Germany

Organisation Website:

<http://www.dlr.de>

EU Contribution: €233,261

Centre Europeen De Recherche Et De Formation Avancee En Calcul Scientifique**Address:**

Avenue Gaspard Coriolis 42
31057 Toulouse
France

Organisation Website:

<http://www.cerfacs.fr>

EU Contribution: €240,000

Dassault Aviation**Address:**

9, Rond-Point des Champs-Élysées - Marcel Dassault
75008 PARIS
France

Organisation Website:

<http://www.dassault-aviation.com>

EU Contribution: €288,175

Federal State Unitary Enterprise Aerohydrodynamic Institute**Address:**

1, Zhykovsky str.
ZHUKOVSKY, MOSCOW REG
140180
Russia

Organisation Website:

<http://www.tsagi.ru>

EU Contribution: €0

Centre De Recherche En Aéronautique**Address:**

Batiment Eole, 1Er Étage - Rue Des Frères Wright 29
6041 Gosselies
Belgium

Organisation Website:

<http://www.cenaero.be>

EU Contribution: €239,953

Technologies:

Computer-aided design and engineering
Improvement of high order methods for computational fluid dynamics for modelling airflows

Development phase: Validation

STRIA Roadmaps: Vehicle design and manufacturing

Transport mode: Air transport

Transport sectors: Passenger transport, Freight transport

Transport policies: Other specified

Geo-spatial type: Other