Go4Hybrid

ONERA
THE FRENCH AEROSPACE LAB

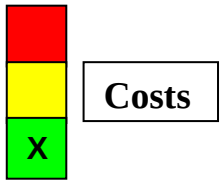
Quarterly Progress Report
QPR_03 **(1 April 2014 – 30 June 2014)**

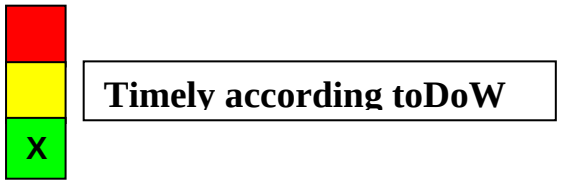

**Technical/Scientific Contact Person :** **Sébastien DECK**

**Organisation :** ONERA
DAAP
8, rue des Vertugadins
92190 Meudon
Tel : +33-(0)1 46 73 43 47
Email: sebastien.deck@onera.fr

## Quick Overview

**Please mark with an "X" in the red, yellow or green boxes how do you assess the present (general) status of your work:**
**(red = critical status, yellow = moderately problematic status, green = everything is running well)**


**Please note:**
**When you have ticked yellow or red boxes, please explain problems you have encountered and possible solutions below:**

- …
- …
- …

**Please double-click on the table to open Excel file**

| | Summary of Effort | Task Status | Effort in Person Months | | | |
|---|---|---|---|---|---|---|
| **Task no.** | **Task title** | **[N / O / C]*)** | **PM in actual quarter** | **PM since 1 October 2013** | **PM according to TA p. 37 / DoW p. 75** | **PM still available** |
| 1.1 | Co-ordination of the project | N | 0,00 | 0,05 | 0,25 | 0,20 |
| 1.2 | Web site / Dissemination / Exploitation | N | 0,00 | 0,00 | 0,25 | 0,25 |
| 2.1 | Non-zonal methods: Development and evaluation for mandatory fundamental test cases | N | 0,75 | 1,00 | 3,00 | 2,00 |
| 2.2 | Non-zonal methods: Demonstration of improvements based on complex test cases | | | | | |
| 3.1 | Embedded methods: Development and evaluation for mandatory fundamental test cases | N | 0,50 | 2,50 | 5,00 | 2,50 |
| 3.2 | Embedded methods: Demonstration of improvements based on complex test cases | N | 0,50 | 0,50 | 5,00 | 4,50 |
| 4.1 | Common assessment platform | | | | | |
| 4.2 | Best-practice, knowledge preservation, and workshop preparation | N | 0,00 | 0,00 | 0,50 | 0,50 |
| | **Σ** | | **1,75** | **4,05** | **14,00** | **9,95** |

***) TaskStatus: N = Not yet started, O = Ongoing, C = Completed**

## Summary of Activities

Please describe concisely, for the actual quarter and task by task, e.g.:

*Work started, work performed, achievements, problems, dissemination activities, technical meetings managed and/or participated in, purchases, subcontracts, and what else is important for monitoring the project*

**Task 1.1:** Internal project management at ONERA

**Task 1.2:** Not yet started

**Task 2.1:** ZDES (mode 2) calculations of the mixing layer test case have been initiated. Lets us be reminded that mode 2 of ZDES is the "automatic" operating mode of ZDES similar to DDES. Turbulent structures educed in figure 1 highlight that the very important delay in the formation of instabilities obtained with standard DDES as well as the significant improvement obtained with ZDES mode 2. Future work will be devoted to a detailed comparison of both calculations together with the experimental data

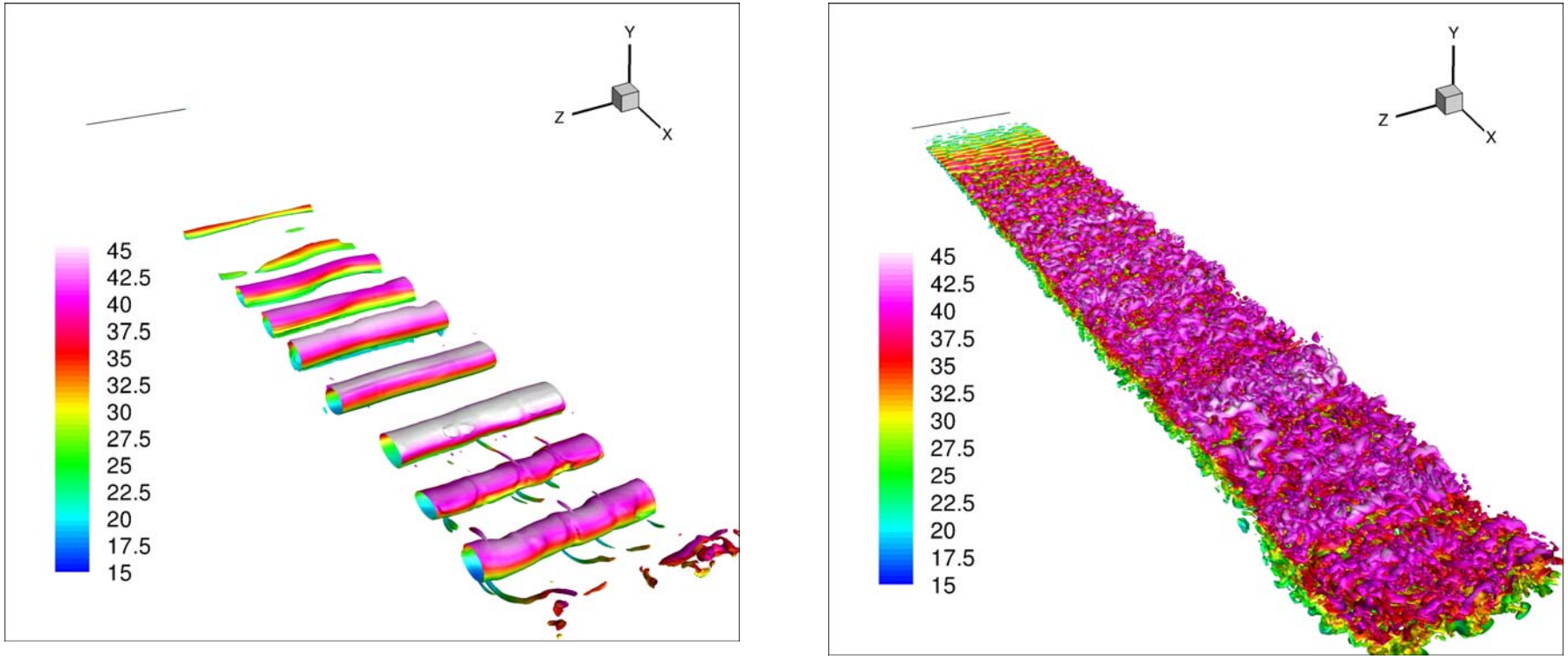



**Figure 1** Turbulent structures educed by the Q criterion. Left: DDES; Right: ZDES mode 2.

**Task 2.2: not involved**

**Task 3.1:** First ZDES (mode 3) calculations on TCF1 have been conducted on the mandatory grid with an interface fixed at 0.125δ where δ is the local boundary layer thickness. Turbulence content is generated with the modified Synthetic Eddy Method adapted to ZDES. As shown in figure 2, turbulent content is generated quickly downstream from the inlet. The dynamic forcing method proposed by Laraufie et al. (JCP, 2011) to limit the adaptation distance has also been assessed.

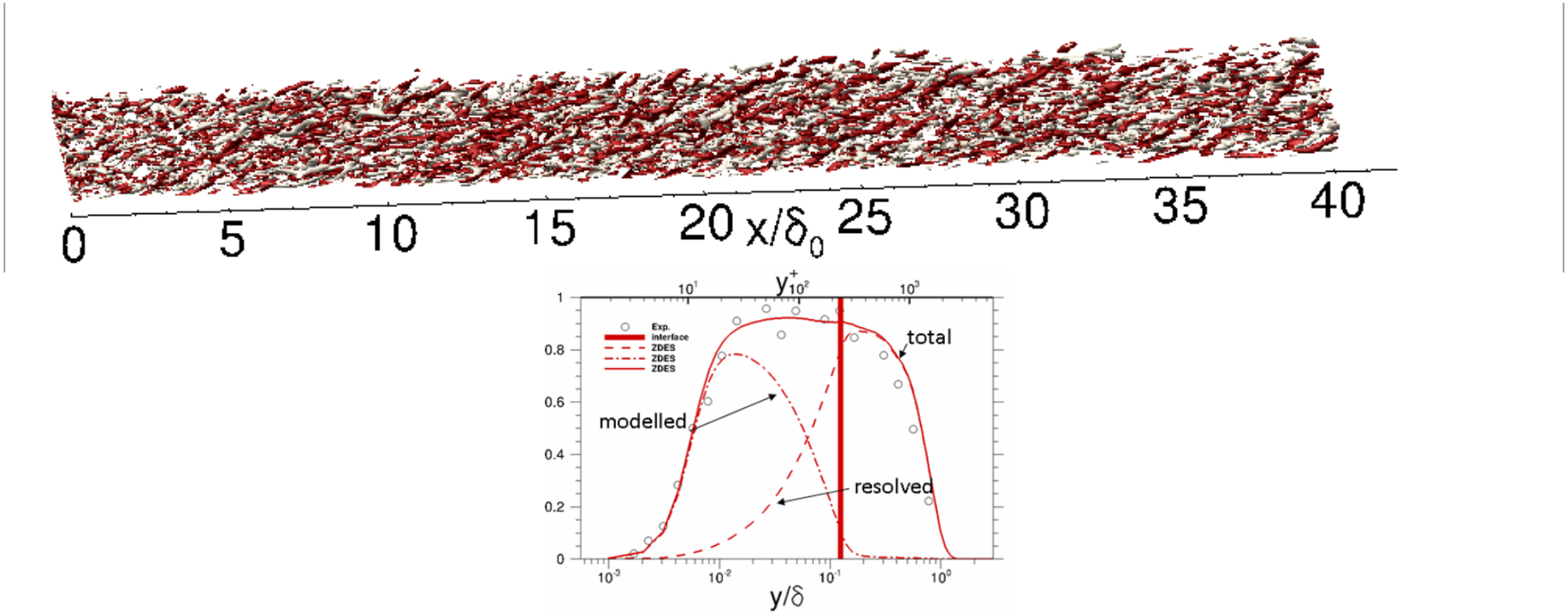



**Figure 2** Top: Turbulent structures educed by the Q criterion. Bottom: Shear stress (resolved-modelled-total) profiles at $Re_\theta$=5200.

**Task 3.2:** Initial preparatory work for the three-element airfoil has been conducted. One of the objectives is to simulate the boundary layer in the vicinity of the main wing trailing edge with mode 3 of ZDES.

**Task 4.1:** **not involved**

**Task 4.2:** Not yet started