

CALM-AA

LINKING SIMULATION AND TESTING IN
AEROACOUSTICS TOWARDS IMPROVED
DEVELOPMENT PROCESSES



**CONNECTING AEROACOUSTIC
SIMULATION & TESTING**

22 / 09 / 2023
1 - 3 PM



www.microdb.fr

BUSINESS CONSORTIUM

The Siemens logo, featuring the word "SIEMENS" in a bold, teal, sans-serif font.

SIEMENS

Siemens Digital Industries Software and Siemens Xcelerator are transforming the everyday by giving companies like yours the agility, flexibility and adaptability to turn ideas into innovation with greater efficiency and speed

The Safran logo, featuring a stylized blue "S" followed by the word "SAFRAN" in a bold, blue, sans-serif font.

SAFRAN

World leader in aircraft landing and braking systems

The Kitware logo, featuring a stylized green and blue "K" followed by the word "kitware" in a blue, sans-serif font.

KITWARE

Specialising in the processing, visualisation and management of scientific data, Kitware develops cutting-edge software and algorithms

The MicrodB logo, featuring a stylized green and blue "M" followed by the word "MiCROdB" in a green, sans-serif font.

MICRODB

SME with expertise in noise source identification with microphone array, developing software and hardware solutions, in partnership with academic institutes and industrial companies

The LVA logo, featuring four icons (a waveform, a bar chart, an ear, and a Wi-Fi symbol) above the text "lva" in a bold, black, sans-serif font, with "laboratoire vibrations acoustique" in a smaller, black, sans-serif font below it.

LVA

Acoustics (LVA), which is part of the Mechanical Engineering and Design Department at the National Institute of Applied Sciences (INSA Lyon), was created in the 1970s to meet the growing interests of industrial companies – in particular transportation companies – centred around the connection between structural dynamics and acoustics.

The Institut Camille Jordan logo, featuring a stylized blue "Math" and "d" inside a circle, followed by the text "Institut Camille Jordan" in a blue, sans-serif font.

INSTITUT CAMILLE JOURDAN

ICJ) is an Unité Mixte de Recherche (UMR) of CNRS, specialised in mathematical modelling and numerical analysis

The LMFA logo, featuring a stylized blue "Lmfa" in a cursive font, with a blue swoosh above it.

LMFA

laboratory, created in 1962 and associated with École Centrale de Lyon, then with CNRS (1973), Université Claude Bernard Lyon 1 (1991) and INSA Lyon (2003), is an Unité Mixte de Recherche (UMR5509). It develops a continuum of research in fluid mechanics and acoustics, from the understanding and the modelling of physical phenomena to applied research, in collaboration with industrial partners and public institutions..



AIM OF THE PROJECT:

PROVIDE A SINGLE POST-PROCESSING TOOL TO LINK SIMULATION AND TESTING IN AEROACOUSTICS

In many industries, the ever-increasing computing capabilities available in research and development departments redefines the balance between physical testing and simulation, leading to a reorganization of product design cycles.

Prototyping and physical tests are then reduced by more intensive and accurate simulations.

The Calm-AA project found its roots in the fact that simulation and testing communities still don't use the same post-processing software to achieve their analysis. As a consequence, comparison, communication, and forward motion is impacted.

Using well-established microphone array methods, and improving all its aspects, is of main interest to unify these domains.

In the project Calm-AA the main ambition is to provide this unified software for the post-processing of data coming from CFD simulation or wind-tunnel testing.

Different drawbacks has been addressed:

- Improving the noise source modelling to improve accuracy of fluid-structure interaction sources, do we need monopoles, dipoles, quadrupoles?
- Improving the propagation model to better represent its behaviour in complex environments, the actual common assumption of free field is enough?
- Improving the source localization algorithms with inverse methods. Better than deconvolutions, inverse methods can describe much better the noise sources in the way that correlations between sources are part of the result. It opens the way for radiation per zones or element estimation on reference location...



Olivier MINCK
Technical Manager

PLANNING

01

Introduction: context & issues (15')

Olivier Minck, MicrodB

02

Aerospace & automotive case studies (15')

Amine Ghouali, Safran Landing Systems

Hadrien Bériot, Siemens

03

CALM-AA R&D (25')

Overview of Siemens achievements in CALM-AA

Hadrien Bériot, Siemens

Sensitivity analysis for direct aeroacoustic simulations

Hugo Vincent, LMFA

A meshless method for 3D acoustic imaging by sonar

Zijian Niu, LVA

Source models and propagation (15')

Simon Bouley, MicrodB

Schwarz-based reduction scheme for the aeroacoustic source model

Naïma Débit, ICJ

04

CALM-AA Industrialisation (10')

Using ParaView for simple acoustic analysis on desktop and VR

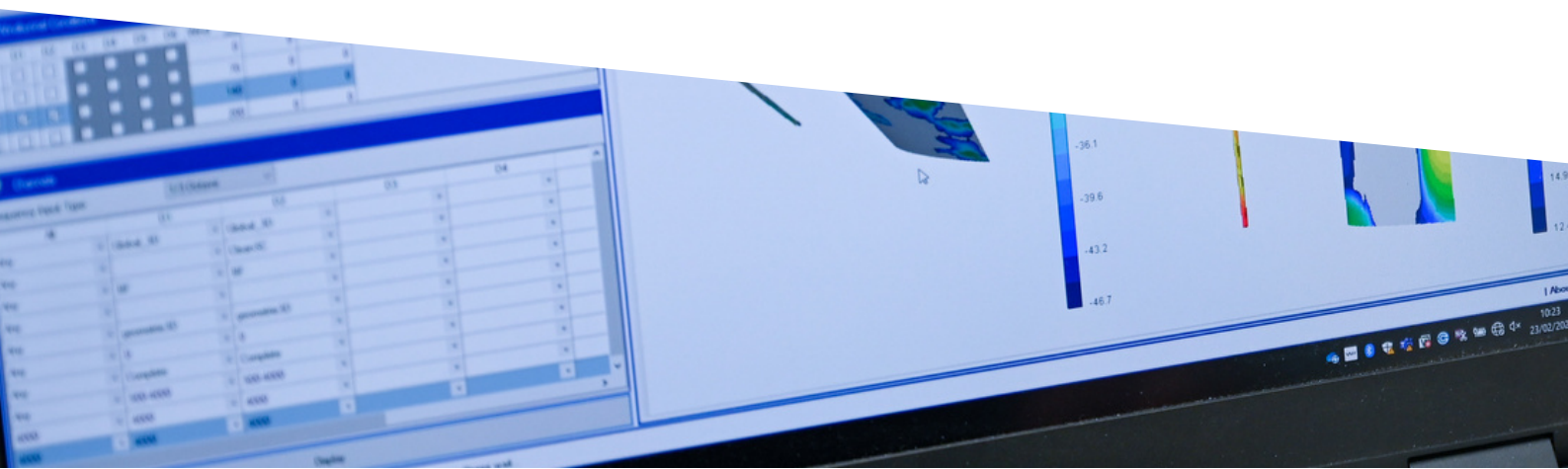
Mathieu Westphal, Kitware

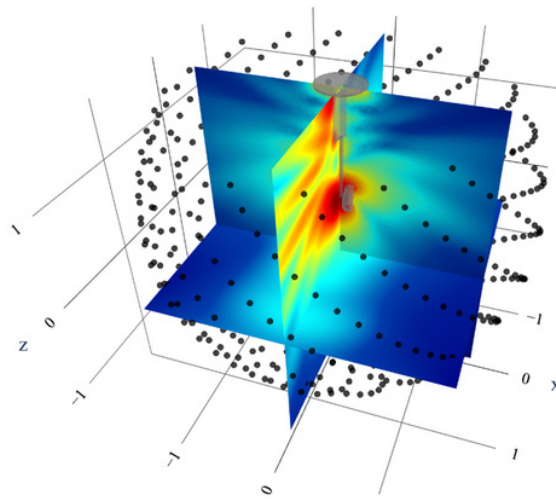
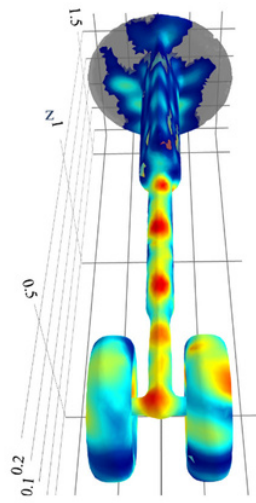
Rod-airfoil application

Hadrien Bériot, Siemens

MicrodB outcome : source characterization for the landing system

Joannès Chambon, MicrodB





PARTNERS

PUBLIC AUTHORITIES – FUNDERS



La Région
Auvergne-Rhône-Alpes



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SIEMENS



SAFRAN

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MiCROdB

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lva laboratoire
vibrations
acoustique



**Institut
Camille
Jordan**



**22/09
2023**

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