STS 14
Sonic Boom Prediction: Near-field Simulation, Far-field Pressure Signature Evaluation, Structural Transmission and Low Boom Design

Chairs: Gérald Carrier* and Pierre-Elie Normand **

* ONERA - The French Aerospace Lab, Meudon Center, France, gerald.carrier@onera.fr
** Dassault Aviation, Saint-Cloud, France, pierre-elie.normand@dassault-aviation.com

Session Abstract

Keywords: Supersonic, near-field pressure field, far-field pressure signature, sound metrics, structural transmission modelling, low boom design, prediction capabilities

Since the retirement of Concorde, many ambitious industrial projects have emerged to be its worthy successor. However current regulations prohibit anyone from operating a civil aircraft at supersonic cruise over land. The reason being the sonic boom felt and heard on ground over the flight path of the supersonic aircraft.

Many researches have showed the way to a design that can diminish the perceived sound level on the ground. The Quiet Super Sonic Technology Demonstrator [1] will provide input concerning the feasibility of low sonic boom design in terms of measures and community response. JAXA intends to demonstrate and validate its "low sonic boom design concept" through flight tests [2]. As for the European side, the project RUMBLE [3] provides sonic boom prediction methodology, sleep studies and structural transmission analysis.

In this context this technical session will focus on the recent international work concerning:

- Near field CFD computation, code-to-code comparison and best practices
- Far field propagation: code-to-code comparison, atmospheric sensitivity, topology effects, earth’s boundary layer’s turbulence effects and best practices
- Structural transmission analysis
- Low boom design

References

[1] https://www.nasa.gov/X59
The following papers and authors are foreseen in STS 14:

**Sonic Boom Prediction Capabilities: Overview of the Project RUMBLE Work Package**
Gérard Carrier, ONERA, Meudon Centre, France, gerald.carrier@onera.fr

**Numerical Modelling Study of Sonic-Boom-Induced Structure Vibration**
Joonsang Park, Joonsang.Park@ngi.no, Finn Løvholt, Finn.Lovholt@ngi.no, Karin Norén-Cosgriff, karin.noren-cosgriff@ngi.no, Jörgen Johansson, Jorgen.Johansson@ngi.no, NGI - Norwegian Geotechnical Institute, Oslo, Norway

**Resolution of the Euler Equations in Curvilinear Coordinates for Sonic Boom Propagation**
Ariane Emmanuelli, ariane.emmanuelli@ec-lyon.fr, Thomas Lechat, thomas.lechat@ec-lyon.fr, Didier Dragna, didier.dragna@ec-lyon.fr, Sébastien Ollivier, sebastien.ollivier@ec-lyon.fr, Philippe Blanc-Benon, philippe.blanc-benon@ec-lyon.fr, École Centrale de Lyon, Écully, France

**Quantification of the Turbulence Effects on Classical and Low Booms**
Roman Leconte, roman.leconte@dalembert.upmc.fr, Régis Marchiano, regis.marchiano@sorbonne-universite.fr, Jean-Camille Chassaing, jean-camille.chassaing@sorbonne-universite.fr, François Coulouvrat, francois.coulouvrat@upmc.fr, Sorbonne Université, Paris, France

**Sensitivity Propagation Analysis of a Supersonic Aircraft Low Boom Signal through Different Atmospheres**
Pierre-Elie Normand, Pierre-elie.normand@dassault-aviation.com, Gérald Carrier, gerald.carrier@onera.fr, Patrice Malbequi, patrice.malbequi@onera.fr, ONERA, France

**Low Sonic Boom Design in the RUMBLE Project: Progress and Challenges**
Olivier Atinault, Olivier.Atinault@onera.fr, Stephen Rolston, Airbus, Bristol, U.K., stephen.roלston@airbus.com, Stephen Powell, Airbus, Bristol, U.K., stephen.powell@airbus.com, Jochen Kirz, DLR, Braunschweig, Germany, Jochen.Kirz@dlr.de, Pierre-Elie Normand, Dassault-Aviation, St. Cloud, pierre-elie.normand@dassault-aviation.com