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STS 14

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

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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

[2] http://www.aero.jaxa.jp/eng/research/frontier/sst/d-send.html

[3] https://ec.europa.eu/inea/en/horizon-2020/projects/h2020-transport/aviation/rumble

The following papers and authors are foreseen in STS 14:

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

Numerical Modelling Study of Sonic-Boom-Induced Structure Vibration
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Resolution of the Euler Equations in Curvilinear Coordinates for Sonic Boom Propagation
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Quantification of the Turbulence Effects on Classical and Low Booms
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Sensitivity Propagation Analysis of a Supersonic Aircraft Low Boom Signal through Different Atmospheres
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Low Sonic Boom Design in the RUMBLE Project: Progress and Challenges
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