

18th AIAA/CEAS Aeroacoustics Conference 2012

33rd AIAA Aeroacoustics Conference

**Colorado Springs, Colorado, USA
4-6 June 2012**

Volume 1 of 5

ISBN: 978-1-62276-215-6

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

The contents of this work are copyrighted and additional reproduction in whole or in part are expressly prohibited without the prior written permission of the Publisher or copyright holder. The resale of the entire proceeding as received from CURRAN is permitted.

For reprint permission, please contact AIAA's Business Manager, Technical Papers. Contact by phone at 703-264-7500; fax at 703-264-7551 or by mail at 1801 Alexander Bell Drive, Reston, VA 20191, USA.

TABLE OF CONTENTS

VOLUME 1

Sound Radiation from Forward Facing Steps	1
<i>Stewart Glegg, Benjamin Bryan, William Devenport, Manuj Awasthi</i>	
Sound Generated by Boundary-Layer Flow over Small Steps: Effect of Step Non-Compactness	13
<i>J. Hao, A. Eltaweel, M. Wang</i>	
The Effects of Scaling on High Subsonic Cavity Flow Oscillations and Control	21
<i>V. Thangamani, K. Knowles, A. Saddington</i>	
Multi-variate Statistics of the Wall Pressure Field beneath Supersonic Turbulent Boundary Layers	37
<i>Alessandro Di Marco, Matteo Bernardini, Sergio Pirozzoli, Roberto Camussi</i>	
Aeroacoustics of a Wall Perforation in the Pure Grazing Flow Regime: Effect of the Perforation Geometry	49
<i>Devis Tonon, Elise Moers, Joachim Golliard, A. Hirschberg</i>	
Investigation of Noise Generated by a DU96 Airfoil	61
<i>William Wolf, Sanjiva Lele, Giridhar Jothiprasad, Lawrence Cheung</i>	
Effects of Mean Flow Convection and Quadrupole Sources on Airfoil Trailing Edge Noise	76
<i>William Wolf, Joao Luiz Azevedo, Sanjiva Lele</i>	
Quadrupole Noise in Turbulent Wake Interaction Problems	95
<i>Christopher Yu, William Wolf, Sanjiva Lele</i>	
Prediction of the Sound Generated by a Rod-airfoil Configuration Using a Compressible Unstructured LES Solver and a FW-H Analogy	113
<i>J. Giret, A. Sengissen, S. Moreau, M. Sanjosé, J. Jouhaud</i>	
Direct Numerical Simulation of the Self-Noise Radiated by an Airfoil in a Narrow Stream	131
<i>J. Winkler, R. Sandberg, S. Moreau</i>	
On the Generation of Airfoil Tonal Noise at Zero Angle of Attack and Low to Moderate Reynolds Number	146
<i>Elias Arcondoulis, Con Doolan, Laura Brooks, Anthony Zander</i>	
A Theoretical and Experimental Study of Broadband Circulation Control Noise	173
<i>Drew Wetzel, Fei Liu, Louis Cattafesta</i>	
Verification of the Accuracy of Non-reflecting Boundary Conditions Using an Analytical Method	192
<i>Nima Mansouri, Ray Hixon, Daniel Ingraham</i>	
Towards a Robust and Accurate CFD/CAA Coupling Procedure for Hybrid Methods in Aeroacoustics -Part 1: On the Optimization of CFD/CAA Coupled Calculations	206
<i>Guilherme Cunha, Stephane Redonnet</i>	
LES of Acoustic-Flow Interaction at an Orifice Plate	221
<i>Emma Alenius, Mats Abom, Laszlo Fuchs</i>	
Implementation of a Vortex Sheet in a Finite Element Model Based on Potential Theory for Exhaust Noise Predictions	235
<i>Albert Prinn, Gwenael Gabard, Hadrien Beriot</i>	
Development of Semi-implicit Runge-Kutta Schemes and Application to a Turbulent Channel Flow	253
<i>Francois Kremer, Christophe Bogey, Christophe Bailly</i>	
Sensibility Analysis and Wave Tracking of Sound	272
<i>Eric Gaudard, Regis Marchiano, Philippe Druault, Francois Vanherpe</i>	
CFD Prediction of Aeroacoustic Noise Generation in a HVAC Duct	284
<i>Elisabeth Gren, Mark Farrall, Fred Mendonça, Karamjit Sandhu</i>	
Quadrupole Effects in the Ffowcs Williams-Hawkings Equation Using Permeable Control Surface	291
<i>Tomoaki Ikeda, Shunji Enomoto, Kazuomi Yamamoto, Kazuhisa Amemiya</i>	
Computation of Sound in a Simplified HVAC Duct Based on Aerodynamic Pressure	304
<i>P. Martinez-Lera, R. Hallez, H. Beriot, C. Schram</i>	
Acoustic Transmission Loss of Perforated Plates	314
<i>Vincent Phong, Dimitri Papamoschou</i>	
A Comparison Study of Reduced Order Models for Aeroacoustic Applications	327
<i>Ka-Him Seid, Gregor Gilka, R. Leung, Frank Thiele</i>	
Panel Method for Turbulence-airfoil Interaction Noise Prediction	350
<i>Leandro De Santana, Christophe Schram, W. Desmet</i>	
Stable Absorbing Layer for Convective Wave Equation	360
<i>I. Sim, M. Kaltenbacher</i>	
Scattering of Simulated Broadband Noise by Conventional and Next Generation Aircraft	367
<i>Ana Tinetti, Mark Dunn</i>	
Hybrid Wing Body Shielding Studies Using an Ultrasonic Configurable Fan Artificial Noise Source Generating Simple Modes	379
<i>Daniel Suliff, Clifford Brown, Bruce Walker</i>	
Interdisciplinary Auralization of Take-off and Landing Procedures for Subjective Assessment in Virtual Reality Environments	418
<i>A. Sahai, E. Anton, E. Stumpf, F. Wefers, M. Vorlaender</i>	
Analysis and Synthesis of Tonal Aircraft Noise Sources	434
<i>Matthew Allen, Stephen Rizzi, Ricardo Burdisso, Selen Okcu</i>	

A Framework for Simulation of Aircraft Flyover Noise Through a Non-standard Atmosphere	449
<i>Michael Arntzen, Stephen Rizzi, Dick Simons, Hendrikus Visser</i>	
Low-speed Jet Dynamics and Sound Radiation	466
<i>André Cavaliéri, Daniele Violato, Daniel Rodriguez, Peter Jordan, Fulvio Searano, Tim Colonius, Yves Gervais</i>	
Full-Scale Jet Noise Characterization Using Scan-Based Acoustical Holography	477
<i>A. Wall, K. Gee, T. Neilson, D. Krueger, M. James, S. Sommerfeldt, J. Blotter</i>	
Noise Predictions for High Subsonic Single and Dual-Stream Jets in Flight	490
<i>Swati Saxena, Philip Morris</i>	
Reduced-order Jet Noise Modelling for Chevrons	514
<i>N. Depuru Mohan, S. Karabasov, O. Graham, A. Dowling, T. Hynes, P. Tucker, H. Xia</i>	
Experimental Investigation of LMS Algorithm for Active Control of Combustion Instabilities: FIR or IIR	529
<i>D. Zhao, Y. Lee</i>	
Indirect Combustion Noise of Auxiliary Power Units	545
<i>Christopher Tam, Sarah Parrish, Jun Xu, William Schuster</i>	
Evaluation of Actuator Disk Theory for Predicting Indirect Combustion Noise	567
<i>Ashish Mishra, Daniel Bodony</i>	
A Comparison of Combustor-Noise Models	604
<i>Lennart Hultgren</i>	
Self-selected, Self-excited Combustion Oscillations in a Rijke-Zhao Tube	631
<i>Dan Zhao</i>	
Implementation of an Efficient Pressure-Based CFD Solver for Accurate Thermoacoustic Computations	654
<i>Jean-Michel Lourier, Massimiliano Di Domenico, Berthold Noll, Manfred Aigner</i>	
Experimental Study of the Effect of Inserts on Flow-Induced Pulsations at T-joints in Ducts	668
<i>Joachim Golliard, Joost Groen</i>	
Acoustic Wave Focusing by Non-uniform Mean Flow in a Rectangular Duct with Viscous Walls	674
<i>Anton Markesteijn, Sergey Karabasov</i>	
Numerical Investigation of Reynolds Number Effect on Lock in Ability of an Aeroacoustic Field in Ducted Flows	688
<i>Cristina Paduano, Craig Meskell</i>	
Thermoacoustical Noise Induced by Laminar Flame Annihilation at Varying Flame Thicknesses	697
<i>G. Geiser, S. Schlimpert, W. Schröder</i>	
Development of Modeling Capabilities for Launch Pad Acoustics and Ignition Transient Environment Prediction	705
<i>Jeffrey West, Louise Strutzenberg, Gabriel Putnam, Peter Liever, Brandon Williams</i>	
Slit Resonator Damping Estimation and Proposal of a New Geometry	720
<i>D. Hori, T. Shimizu, K. Kitamura, K. Kuzuu, A. Oyama</i>	
Extension of Amiet's Theory for the Aeroacoustic Analysis of a Wing-Flap Configuration Including Acoustic Scattering	739
<i>Hervé Denayer, Wim De Roeck, W. Desmet, Christophe Schram</i>	
A Numerical Study to Optimise Blowing Flow Control for Flap Side-Edge Noise Reduction	751
<i>Kondwani Kanjere, David Angland, Xin Zhang</i>	
Aeroacoustic Investigations of a Leading Edge Slat by Means of the Causality Correlation Method	772
<i>A. Henning, C. Spehr, B. Wrede, M. Pott-Pollenske, R. Geisler</i>	
On Detrimental Effects of Excrescences on the Slat Noise	784
<i>Lukas Bandle, Daniel Souza, Leandro Simoes, Marcello Medeiros</i>	
Slat Noise Measurement and Numerical Prediction in the VALIANT Programme	801
<i>Eric Manoha, Marc Terracol, Benoît Lemoine, Ingrid Le Griffon, Thomas Le Garrec</i>	
The Influence of Realistic Reynolds Numbers on Slat Noise Simulations	822
<i>David Lockard, Meelan Choudhari</i>	
A Generic Computational Study of Broadband High-lift Noise Generation for Simplified Slat and Flap Problems	838
<i>Juergen Dierke, Christina Appel, Jona Siebert, Roland Ewert</i>	
CAA Study of Helmholtz Resonator Application on Edge-Tone Noise Suppression	862
<i>J. Yen, E. Duell, J. Walter, A. Kharazi</i>	

VOLUME 2

Parallelization of Compact Finite-difference Schemes and Filters Based on a Linear-algebraic Transformation	881
<i>Jae Wook Kim</i>	
Non-conservative Implicit Large-eddy Simulation Method for Predicting the Noise Radiated by Subsonic Jets	903
<i>Carlos Moser, Marcello Medeiros</i>	
A Hybrid LES/CAA Method Applied to Jet Noise Prediction	915
<i>Odile Labbe, Christophe Peyret, Gilles Rahier, Maxime Huet</i>	
A High-Fidelity CFD/BEM Methodology for Launch Pad Acoustic Environment Prediction	930
<i>Abhijit Tosh, Peter Liever, Fritz Owens, Yijun Liu</i>	
Airfoil Flow and Noise Computation Using Monotonically Integrated LES and Acoustic Analogy	949
<i>Vasily Semiletov, Sergey Karabasov, Georgy Faranosov, Mikhail Zaitsev</i>	
The Modeling of Moving Sources for Time-domain Simulations of Outdoor Sound Propagation	958
<i>Didier Dragna, Philippe Blanc-Benon, Franck Poisson</i>	
Experimental Study of Noise Emitted by Circular Cylinders with Large Roughness	972
<i>Antoni Alomar, David Angland, Xin Zhang</i>	

Fluid Loading in Structural Acoustics of an Elastic Airfoil	996
<i>H. Atassi, A. Kozlov</i>	
Effect of Span and Compressibility on the Noise Prediction of a Katana Blade	1006
<i>M. Sanjosé, S. Moreau, J. Christophe, M. Roger</i>	
On the Scattering of Aerodynamic Noise by a Rigid Corner	1019
<i>Korcan Kucukcoskun, Michel Roger</i>	
On the Contribution of Higher Azimuthal Modes to the Near- and Far-Field of Jet Mixing Noise	1036
<i>Andrej Neifeld, Roland Ewert</i>	
Wavepackets in the Velocity Field of Turbulent Jets	1060
<i>André Cavalieri, Daniel Rodriguez, Peter Jordan, Tim Colonius, Yves Gervais</i>	
Acoustics Measurements of Scale Models of Military Style Supersonic Beveled Nozzle Jets with Interior Corrugations	1087
<i>Russell Powers, Dennis McLaughlin</i>	
Parabolized Stability Equation Models in Turbulent Supersonic Jets	1111
<i>Daniel Rodriguez, Aniruddha Sinha, Guillaume Brès, Tim Colonius</i>	
Application of a Phased Array Technique to DNS-Generated Turbulent Subsonic Jet Data	1130
<i>Richard Sandberg, Brian Tester</i>	
On the Linearity of the Quieting of High Speed Mixing Layers by Heating	1142
<i>D. Bodony, R. Jambunathan</i>	
Rotor Inflow Noise Caused by a Boundary Layer: Inflow Measurements and Noise Predictions	1157
<i>M. Morton, W. Devenport, W. Alexander, S. Glegg, A. Borgoltz</i>	
Open Rotor Tone Acoustics: Near-field Prediction & Projection	1190
<i>Prathiban Sureshkumar, Michael Kingan</i>	
Aeroacoustic Prediction of the Tonal Noise Radiated by a Ring Fan in Uniform Inlet Flow	1215
<i>Stephan Magne, Marlène Sanjosé, Stéphane Moreau, Alain Berry</i>	
Analytical Solutions for Acoustic Integral Solvers	1227
<i>Paul Thomas, Cesare Hall, Aimee Morgans</i>	
On the Influence of Trailing-edge Serrations on Open-rotor Tonal Noise	1243
<i>Christian Weckmüller, Sebastien Guerin</i>	
Computational AeroAcoustics of Counter Rotating Open Rotor Model on Rear Full Scale Airplane in Cruise Condition	1258
<i>Thomas Le Garrec, Gabriel Reboul</i>	
An Experimental Study on a Low Noise Blade Concept for CROR	1276
<i>Michael Bauer, Daniel Redmann, Reinhard Pongratz</i>	
Aerodynamic and Basic Acoustic Optimization of a Counter Rotating Open Rotor with Experimental Verification	1284
<i>Rainer Schnell, Jianping Yin, Stefan Funke, Henri Siller</i>	
Computational Tonal Noise Prediction for the Advanced Noise Control Fan	1301
<i>A. Maldonado, R. Bobenrieth, B. Pimenta</i>	
Impact of Bypass-duct Bifurcations on Fan Noise	1363
<i>A. Holewa, C. Weckmuller, S. Guerin</i>	
Multimode Blockage Due to Rotors and Application to Turbomachinery Broadband Noise	1375
<i>Gareth Jenkins, Christopher Powles, Phillip Joseph</i>	
Several Technological Effects on Tonal Fan Noise Prediction	1398
<i>Jerome De Laborderie, Stéphane Moreau, Alain Berry, Helene Posson</i>	
Time-resolved Rotating Instability Waves in an Annular Cascade	1417
<i>Benjamin Pardowitz, Ulf Tapken, Lars Enghardt</i>	
Study of the Attenuation of Waves Propagating Through Fixed and Rotating Turbine Blades	1431
<i>Ignacio Duran, Stéphane Moreau</i>	
Noise Reduction Using Combined Trailing Edge and Leading Edge Serrations in a Tandem Airfoil Experiment	1448
<i>Mathieu Gruber, Phillip Joseph, Cyril Polacsek, Tze Pei Chong</i>	
A Numerical Investigation of the Laminar Instability Multi-Tonal Noise of Aerofoils	1470
<i>Michele De Gennaro, Helmut Kuehnelt, Manfred Kaltenbacher, Andreas Huppe</i>	
High-Accuracy Simulations of Flow-Acoustic Resonant Interactions in Airfoil Transitional Boundary Layers	1494
<i>Vladimir Golubev, Lap Nguyen, Michel Roger, Miguel Visbal, Jonathan Dudley</i>	
Aeroacoustic Response of Propellers to Sheared Turbulent Inflow	1510
<i>Matthew Catlett, Jason Anderson, Devin Stewart</i>	
Aerodynamic Noise from a Poroelastic Trailing Edge with Implications for the Silent Flight of Owls	1539
<i>Justin Jaworski, Nigel Peake</i>	
Two-Dimensional Evaluation of Turbulent Boundary Layer Pressure Fluctuations at Cruise Flight Conditions	1552
<i>Stefan Haxter, Carsten Spehr</i>	
Fundamental Experimental Studies Supporting On-Blade Tip Air Blowing Control of In-Plane Rotor Harmonic Noise	1569
<i>Daniel Sargent, Fredric Schmitz</i>	
Reduction of Helicopter BVI Noise Using Active Flow Control; the Case of Vortex Street Interactions	1589
<i>C. Velez, M. Ilie</i>	
The Impulse Response of a High-Speed Jet Forced with Localized Arc Filament Plasma Actuators	1603
<i>A. Sinha, H. Alkandry, M. Kearney-Fischer, M. Samimy</i>	
Active Jet Noise Reduction by Oscillating Mechanical Flaps at the Nozzle Exit	1620
<i>Michael Bauer, Lars Pannier</i>	

Axisymmetrical Instability Wave Control due to Resonance Coupling of Azimuthal Modes in High-Speed Jet Issuing from Corrugated Nozzle	1628
<i>Victor Kopiev, Nikolay Ostrikov</i>	
Theoretical Investigation of the Effectiveness of Artificial Instability Waves Excitation in Subsonic Jets	1652
<i>Georgy Faranosov</i>	
CABARET Method on Unstructured Hexahedral Grids for Jet Noise Computation	1670
<i>Georgy Faranosov, Vasily Goloviznin, Sergey Karabasov, Vasily Kondakov</i>	
Numerical Comparison Between the Dynamic Mode Decomposition and the Arnoldi Extraction Technique on an Afterburner Test Case	1689
<i>G. Jourdain, L. Eriksson</i>	
On the Performance of Airframe Noise Prediction On Unstructured Grids	1700
<i>M. Bauer, J. Dierke, R. Ewert</i>	
Prediction of Subsonic Jet Noise Relying on a Sweeping Based Turbulence Generation Process	1726
<i>A. Lafitte, T. Le Garrec, C. Bailly, E. Laurendeau</i>	
Verification of a Compact 6th-order Boundary Stencil for Parallel Applications Using External Verification Analysis (EVA)	1742
<i>Daniel Ingraham, Ray Hixon</i>	

VOLUME 3

The Effect of High Level Multi-tone Excitation on the Acoustic Properties of Perforates and Liner Samples	1753
<i>Hans Böden</i>	
A Computational Study of the Effects of Liner Damage on Zero-splice Turbofan Intake Liners	1764
<i>P. Mustafa, J. Astley, R. Sugimoto</i>	
Discontinuous Galerkin Method for Acoustic Modes Computation in Lined Ducts	1780
<i>Lucas Pascal, Estelle Piot, Gregoire Casalis</i>	
Prediction of Transmission Loss through the Treated Inlet Duct of an Aircraft Auxiliary Power Unit	1792
<i>Lysbeth Lieber, Daniel Brown</i>	
Acoustic Transmission Through a 3D Rotating Fan Using Computational Aeroacoustics	1807
<i>D. Mincu, C. Polacsek, E. Manoha, V. Clair</i>	
Scattering of Wavepackets by a Flat Plate in the Vicinity of a Turbulent Jet	1817
<i>André Cavalieri, Peter Jordan, Yves Gervais</i>	
Investigation of Twin Jet Aeroacoustic Properties in the Presence of a Hybrid Wing Body Shield	1826
<i>Michael Doty</i>	
Modeling of Noise Reduction for Turbulent Jets with Induced Asymmetry	1850
<i>Dimitri Papamoschou, Sara Rostamionjezi</i>	
Aeroacoustics of Three-Stream Jets	1878
<i>Brenda Henderson</i>	
Effect of Initial Condition on Subsonic Jet Noise from Two Rectangular Nozzles	1893
<i>Khairul Zaman</i>	
Effect of Nozzle-exit Flow Conditions on the Flow and Acoustic Properties of Imperfectly Expanded Supersonic Jets	1906
<i>Junhui Liu, K. Kailasanath, Jay Boris, Nick Heeb, David Munday, Ephraim Gutmark</i>	
Mode Switching of Jet Noise Screech	1932
<i>Nick Heeb, Pablo Mora Sanchez, Jeffrey Kastner, Ephraim Gutmark, K. Kailasanath, Junhui Liu</i>	
Statistical Modeling of BBSAN Including Refraction Effects	1944
<i>Cyprien Henry, Christophe Bailly, Guillaume Bodard</i>	
A Simple, But Efficient Aeroacoustic Model of Jets	1962
<i>Luigi Morino, Roberto Camussi, Giovanni Bernardini, Paolo Gradassi, Michel Onori</i>	
Direct Noise Simulation of Near Field Noise during a Gas Injection Process with a Discontinuous Galerkin Approach	1972
<i>Tim Kraus, Florian Hindenlang, Daniel Harlacher, Claus-Dieter Munz, Sabine Roller</i>	
Computational Study of the Effect of Installation Geometry on the Jet Noise	1984
<i>Ravi Ramamurti, Junhui Liu, K. Kailasanath, Brenda Henderson</i>	
Computational Method for Evaluating Meteorites As Sources of Sonic Boom	1997
<i>Martin Henneton, Philippe Delorme, Olaf Gainville, Christophe Millet, François Coulouvrat</i>	
Advanced Optimization Approach for Supersonic Low-Boom Design	2007
<i>Andrea Minelli, Itham Salah El Din, Gerald Carrier</i>	
Coupled Structural-acoustic Response of a Duct-mounted Elastic Plate with Grazing Flow	2033
<i>Mahesh Suheendran, Daniel Bodony, Philippe Geubelle</i>	
Flow Induced Vibrations in a Rocket Engine Manifold	2069
<i>J. Peugeot, A. Frendi</i>	
Flow and Acoustic Excitation Mechanisms in a Nuclear Reactor Steam-line and Branch Pipe Network	2088
<i>J. Lirvat, F. Mendonça, P. Veber, L. Anderson</i>	
On the Interaction of 3D Protuberances with a Supersonic Turbulent Boundary Layer	2095
<i>P. Hahn, A. Frendi</i>	
The Aeroacoustic Wind Tunnel DNW-NWB	2114
<i>Andreas Bergmann</i>	

Experimental and Numerical Studies of the Low Speed Wind Tunnel DNW-NWB's Open Test Section Towards an Aeroacoustic Facility	2126
<i>Vlad Ciobaca, Stefan Melber-Wilkending, Andreas Bergmann, Albert Küpper, Georg Wichmann</i>	
Acoustical Preexamination Work and Characterization of the Low Noise Wind Tunnel DNW-NWB	2137
<i>Michael Pott-Pollenske, Wilhelm Von Heesen, Andreas Bergmann</i>	
Investigations and Measures to Improve the Acoustic Characteristics of the German-dutch Wind Tunnel DNW-LLF	2152
<i>H. Holthusen, A. Bergmann, P. Sijtsma</i>	
Aeroacoustic Optimization of the NWB Airline and Turning Vanes Based on High Fidelity CFD and Acoustic Simulation	2169
<i>Stefan Melber-Wilkending, Andreas Bergmann</i>	
The New NWB Ventilator: A Practical Case of Design-to-noise	2186
<i>A. Moreau, S. Guerin, L. Enghardt, A. Le Denmat, E. Nicke, S. Weber, S. Diehl, P. Koch</i>	
The Anechoic Plenum of the DNW-NWB Aeroacoustic Wind Tunnel	2209
<i>Thomas Loeser, Elmar Schröder</i>	
Acoustic Upgrades to Wind Tunnels at the National Research Council Canada	2223
<i>G. Syms</i>	
A RANS-based Statistical Noise Model for Trailing Edge Noise	2238
<i>C. Albarracin, C. Doolan, R. Jones, C. Hansen, L. Brooks, M. Teubner</i>	
Multi-objective Optimization of Airfoil Trailing Edge Noise with Three Different Measures	2253
<i>Sheng Qiu, Wenbin Song, Hong Liu</i>	
Impact of Spanwise Oscillation on Trailing-Edge Noise	2271
<i>Seong Ryong Koh, Matthias Meinke, Wolfgang Schröder</i>	
Numerical Study of Self-Noise Produced by an Airfoil with Trailing-Edge Serrations	2284
<i>Renzo Arina, Roberto Della Ratta Rinaldi, Andrea Iob, Davide Torzo</i>	
On the Airfoil Self-noise Reduction by Trailing Edge Serrations of Non-insertion Type	2297
<i>Tze Pei Chong, Phillip Joseph, Mathieu Gruber</i>	
On the Noise Reduction Mechanism of a Flat Plate Serrated Trailing Edge at Low-to-moderate Reynolds Number	2307
<i>Danielle Moreau, Laura Brooks, Con Doolan</i>	
Discontinuous Galerkin Schemes for the Direct Numerical Simulation of Fluid Flow and Acoustics	2327
<i>Stefan Fechter, Florian Hindenlang, Hannes Frank, Claus-Dieter Munz, Gregor Gassner</i>	
CFD Investigation of Noise Around a Landing Gear	2340
<i>F. Fortin, J. Syms, C. Clark, S. McIlwain</i>	
CAA Methodology to Simulate Turbulence-airfoil Noise	2361
<i>Vincent Clair, Cyril Polacsek, Thomas Le Garrec, Gabriel Reboul</i>	
Jet Noise Simulation with Realistic Nozzle Geometries Using Fully Unstructured LES Solver	2378
<i>A. Fosso-Pouangue, M. Sanjosé, S. Moreau</i>	
Towards a Robust and Accurate CFD/CAA Coupling Procedure for Hybrid Methods in Aeroacoustics Part 2 - On the Application of the CFD-CAA Surface Weak Coupling Methodology to Realistic Aircraft Noise Problems	2396
<i>Stephane Redonnet, Guilherme Cunha</i>	
Validation of a Hybrid Simulation Method for Flow Noise Prediction	2419
<i>Florian Schwefirm, Johannes Kreuzinger, Nikolaus Peller, Michael Hartmann</i>	
Numerical Prediction Method for the Acoustic Characterization of Network Elements in Presence of Mean Flow	2432
<i>H. Shi, R. Arina, A. Iob, R. Della Ratta Rinaldi, D. Tonon</i>	
Evaluation of Parallel-Element, Variable-Impedance, Broadband Acoustic Liner Concepts	2446
<i>Michael Jones, Brian Howerton, Earl Ayle</i>	
Broadband Liner Optimization for the Source Diagnostic Test Fan	2463
<i>Douglas Nark, Michael Jones</i>	
Predicting the Inflow Distortion Tone Noise of the NASA Glenn Advanced Noise Control Fan with a Combined Quadrupole-Dipole Model	2476
<i>Lisa Koch</i>	
Development and Validation of an Interactive Liner Design and Impedance Modeling Tool	2491
<i>Brian Howerton, Michael Jones, James Buckley</i>	
Liner Impedance Eduction Technique Based on Velocity Fields	2510
<i>Estelle Piot, Julien Primus, Frank Simon</i>	
Evaluation of Wall Boundary Conditions for Impedance Eduction Using a Dual-Source Method	2528
<i>Willie Watson, Michael Jones</i>	
Influence of Cavity Design on the Performance of Hot-Stream Bias Flow Liners	2545
<i>Claus Lahiri, Karsten Knobloch, Friedrich Bake, Sermed Sadig</i>	
Validation Tests for Flow Induced Excitation and Noise Radiation from a Car Window	2555
<i>M. Smith, E. Latorre Iglesias, P. Bremner, F. Mendonça</i>	
A Comparison Between the Effects of Turbulent and Acoustic Wall Pressure Fluctuations Inside a Car	2565
<i>Marie Cabrol, Yves Detandt, Michael Hartmann, Alexandra Mutzke</i>	
The Influence of Boundary Layer Parameters on Interior Noise	2573
<i>Daniel Palumbo, Joana Rocha</i>	
A Novel Finite-element Family for Interior Acoustics	2586
<i>Luigi Morino, Fabio Cetta, Giovanni Bernardini</i>	

Wind Noise Caused by the Side-Mirror and A-Pillar of a Generic Vehicle Model	2599
<i>Michael Hartmann, Joerg Ocker, Timo Lemke, Alexandra Mutzke, Volker Schwarz, Hironori Tokuno, Reinier Toppinga, Peter Unterlechner, G. Wickem</i>	

VOLUME 4

Vibroacoustic Source Mechanisms under Aeroacoustic Loads	2625
<i>Paul Bremner</i>	
Sound vs. Pseudo-sound Contributions to the Wind Noise inside a Car Cabin: A Modal Approach	2645
<i>F. Vanherpe, L. Olivas Duarte, P. Lafon</i>	
In-flight Sound Measurements: A First Overview	2663
<i>Carsten Spehr, Holger Hennings, Heino Buchholz, Mohamed Bouhaj, Stefan Haxter, Anne Hebler</i>	
Time-Domain Analysis of Excited Subsonic Jet Noise	2676
<i>Martin Kearney-Fischer, Aniruddha Sinha, Mo Samimy</i>	
Noise Reduction in Supersonic Jets by Nozzle Fluidic Inserts	2712
<i>Ching-Wen Kuo, Philip Morris, Dennis McLaughlin</i>	
Control of a Supersonic Rectangular Jet Using Plasma Actuators	2731
<i>Michael Crawley, Martin Kearney-Fischer, Mo Samimy</i>	
Large-eddy Simulation for Supersonic Rectangular Jet Noise Prediction: Effects of Chevrons	2750
<i>Joseph Nichols, Sanjiva Lele, Parviz Moin, Frank Ham, James Bridges</i>	
Unstructured Large Eddy Simulation of a Hot Supersonic Over-Expanded Jet with Chevrons	2761
<i>Guillaume Brès, Joseph Nichols, Sanjiva Lele, Frank Ham, Robert Schlinker, Ramons Reba, John Simonich</i>	
Axisymmetry and Azimuthal Modes in Jet Noise	2777
<i>Håvard Vold, Parthiv Shah, Philip Morris, Yongle Du, Dimitri Papamoschou</i>	
The Scaling of Broadband Shock-Associated Noise with Increasing Temperature	2808
<i>Steven Miller</i>	
On Open-Rotor Blade-Vortex Interaction Noise	2834
<i>Michel Roger, Christophe Schram, Stéphane Moreau</i>	
Advanced Time Domain Noise Prediction Methods for Open Rotors and Installation Effects	2855
<i>Mark Dunn, Ana Tinetti</i>	
Aeroacoustic Computation of a Contra Rotating Open Rotor Model with Test Rig Installation Effects	2870
<i>Fabrice Falissard, Ronan Boisard, Gregory Delattre</i>	
Comparative Study of the Effects of Sweep and Humps on High-Speed Propeller Blades	2883
<i>Benoit Marinus</i>	
Aeroacoustic Tests of Isolated Open Rotors at High Speed	2899
<i>Anthony Parry, Kevin Britchford, Michael Kingan, Prathiban Sureshkumar</i>	
Computational Strategy for Predicting CROR Noise at Low-speed Part I: Review of the Numerical Methods	2912
<i>Y. Colin, A. Carazo, B. Caruelle, T. Node-Langlois, A. Parry</i>	
Computational Strategy for Predicting CROR Noise at Low-speed Part II: Investigation of the Noise Sources	
Computation with the Chorochronic Method	2927
<i>Y. Colin, F. Blanc, B. Caruelle, F. Barrois, N. Djordjevic</i>	
Computational Strategy for Predicting CROR Noise at Low-speed Part III: Investigation of Noise Radiation with the Ffowcs Williams-Hawkings Analogy	2944
<i>Y. Colin, B. Caruelle, A. Parry</i>	
Circular Harmonics Beamforming with Multiple Rings of Microphones	2955
<i>Pieter Sijtsma</i>	
Observer-Based Beamforming Algorithm for Real-Time Acoustic Array Signal Processing	2967
<i>L. Bai, X. Huang, E. Peers</i>	
Beamforming-Based Noise Level Measurements in Hard-Wall Closed-Section Wind Tunnels	2980
<i>Vincent Fleury, Renaud Davy</i>	
Wavespace-Based Coherent Deconvolution	3002
<i>Christopher Bahr, Louis Cattafesta</i>	
Far Field Wall-mounted Microphone Device for the S1MA Anechoic Closed-section Wind Tunnel Applied to Open Rotor	3025
<i>Fabien Mery, Maxime Rey, Renaud Davy, Rasika Fernando</i>	
High-resolution Fly-over Beamforming Using a Small Practical Array	3041
<i>Jorgen Hald, Yutaka Ishii, Tatsuya Ishii, Hideshi Oinuma, Kenichiro Nagai, Yuzuru Yokokawa, Kazuomi Yamamoto</i>	
Silent Owl Flight: Acoustic Wind Tunnel Measurements on Prepared Wings	3056
<i>Thomas Geyer, Ennes Sarradj, Christoph Fritzsche</i>	
Acoustic Surveys of a Scaled-Model CESTOL Transport Aircraft in Static and Forward Speed Conditions	3073
<i>Nathan Burnside, William Horne</i>	
Depth Effects on the Flow Features and Noise Signature of Shallow Cylindrical Cavities at a Mach Number of 0.25	3084
<i>Olivier Marsden, Christophe Bogey, Christophe Bailly</i>	
Aeroacoustic Study of a High-Fidelity Aircraft Model: Part 1—Steady Aerodynamic Measurements	3099
<i>Mehdi Khorrami, Judith Hannon, Dan Neuhart, Gregory Markowski, Thomas Van De Ven</i>	
Aeroacoustic Study of a High-Fidelity Aircraft Model: Part 2—Unsteady Surface Pressures	3117
<i>Mehdi Khorrami, Dan Neuhart</i>	
Towards Numerical Aircraft Noise Certification: Analysis of a Full-Scale Landing Gear in Fly-Over Configuration	3139
<i>Damiano Casalino, Swen Noelting, Ehab Fares, Thomas Van De Ven, Franck Perot, Guillaume Brès</i>	

Numerical Investigation of a 1/3- and Full-Scale Partially-Dressed Small Business Jet Landing Gear	3167
<i>Mohammad Tabesh, George Waller</i>	
New Algorithms for Reduced Memory and Real-Time Noise Prediction	3180
<i>B. Goldman, K. Brentner</i>	
A Three-parameter Langevin Model for Hot Jet Mixing Noise Prediction	3194
<i>Roland Ewert, Andrej Neifeld, Attila Wohlbrandt</i>	
Stochastic Sources of Broadband Noise for Time-Domain Simulations of Duct Acoustics	3207
<i>Gwenael Gabard</i>	
An Analysis of Dispersion and Dissipation Properties of Hermite Methods and its Application to Direct Numerical Simulation of Jet Noise	3222
<i>C. Jang, D. Appelo, T. Colonius, T. Hagstrom, M. Inkman</i>	
Power Series Method for Time-Integration in Computational Acoustics	3232
<i>Hao Shen</i>	
Physics of Acoustic Radiation from Jet Engine Inlets	3244
<i>Christopher Tam, Sarah Parrish, Edmane Envia, Eugene Chien</i>	
Determination of the Impedance for Lined Ducts with Grazing Flow	3284
<i>Lars Enghardt, Anita Schulz, Andre Fischer, Stefan Busse</i>	
A Comparison of Ensemble Averaging Methods Using Dean's Method for In-Situ Impedance Measurements	3296
<i>William Schuster</i>	
Configuration Effects on Liner Performance	3313
<i>Carl Gerhold, Martha Brown, Michael Jones, Brian Howerton</i>	
Direct Numerical Simulation of Three-Dimensional Honeycomb Liners with Turbulent Boundary Layer	3330
<i>Qi Zhang, Daniel Bodony</i>	
On the Adjoint Problem in Duct Acoustics and Its Solution by the Time Domain Wave Packet Method	3357
<i>Fang Hu, Ibrahim Kocaogul, Xiaodong Li</i>	
Green's Functions for In-Duct Beamforming Applications	3379
<i>Pieter Sijtsma</i>	
Effects of Initial Shear-layer Thickness on Turbulent Subsonic Jets at Moderate Reynolds Numbers	3392
<i>Christophe Bogey, Olivier Marsden, Christophe Bailly</i>	
Correlation Model for Noise Sources in Turbulent Jet Based on Birth of Vortices As a Key Event	3410
<i>Victor Kopiev, Sergey Chernyshev</i>	
Source Mechanisms of Jet Crackle	3430
<i>Aaron Anderson, Jonathan Freund</i>	
Acoustic Measurements of Rectangular Nozzles with Bevel	3440
<i>James Bridges</i>	
Chevron Nozzle Effects on Wavepacket Sources in a Supersonic Jet	3458
<i>Ramons Reba, John Simonich, Robert Schlinker</i>	
Large-Eddy Simulation of the Interaction of a Jet with a Wing	3471
<i>Maksym Bondarenko, Zhiwei Hu, Xin Zhang</i>	
A Twenty Degree-of-freedom Model of Sound Source Dynamics in a Turbulent Jet	3486
<i>K. Franck, L. Cordier, P. Jordan, J. Deville</i>	

VOLUME 5

Nozzle Throat Optimization on Acoustics and Performance of a Supersonic Jet	3498
<i>D. Cuppoletti, E. Gutmark, K. Gustafsson, H. Hafsteinsson, L. Eriksson, E. Prisell</i>	
Experimental Investigation of Pressure Fluctuations in the Near Field of Subsonic Jets at Different Mach and Reynolds Numbers	3515
<i>Silvano Grizzi, Alessandro Di Marco, Roberto Camussi</i>	
Nonlinear Evolution of Noise from a Military Jet Aircraft during Ground Run-up	3525
<i>Kent Gee, J. Micah Downing, Michael James, Robert McKinley, Richard McKinley, Tracianne Neilsen, Alan Wall</i>	
Jet Noise Receptivity to Nozzle-upstream Perturbations in Compressible Heated Jets	3538
<i>Y. See, G. Amini, C. Koh, M. Ihme</i>	
Shear Layer Corrections for Non-Axisymmetric Wind Tunnel and Applications	3550
<i>Krishna Viswanathan, Incheol Lee</i>	
Supersonic Jet Impingement on a Flat Plate	3586
<i>M. Brown, A. Frendi</i>	
Handling of Non-Periodic Contra Rotating Open Rotor Data	3601
<i>Rinie Akkermans, Jan Delfs, Markus Lummer, Malte Siefert, Bastien Caruelle, Christian Tiedemann</i>	
Rotor Inflow Noise Caused by a Boundary Layer: Theory and Examples	3611
<i>S. Glegg, M. Morton, W. Devenport</i>	
Nearfield Unsteady Pressures at Cruise Mach Numbers for a Model Scale Counter-rotation Open Rotor	3629
<i>David Stephens</i>	
Prediction of Tonal Aerodynamic Noise from Open Rotors	3640
<i>Anupam Sharma, Hsuannien Chen</i>	
Buzz Saw Noise Behavior Due to Influence of Potential Perturbation	3656
<i>Tsutomu Oishi, Shinya Kusuda, Hidekazu Kodama, Masanobu Namba</i>	
Acoustic Analogy in Swirling Mean Flow Applied to Predict Rotor Trailing-edge Noise	3669
<i>Helene Posson, Nigel Peake</i>	

Development of Fan Broadband Noise Semi-empirical Prediction Method Adjustable from Operation Point	3694
<i>R. Guimaraes, P. Greco, B. Afalo</i>	
Fan Broadband Interaction Noise Modeling	3708
<i>S. Grace, A. Wixom, J. Winkler, D. Sondak, M. Logue</i>	
Numerical and Experimental Investigation of Mode Scattering at a Fan Casing Liner	3733
<i>Alessandro Bassetti, Henri Siller, Lars Enghardt</i>	
A Comparison of Fan Inlet Dynamic Wall Pressure Measurements from Rig and Engine Tests	3742
<i>Taylor Marotta, William Schuster</i>	
Extracting Engine Noise Source Levels from Phased Arrays with Improved Internal Source Models and Evaluation Against Simulated and Measured Data	3750
<i>Brian Tester, Tiphaine Recoup, Gwenael Gabard</i>	
Early Development of Time-Resolved Volumetric Doppler Velocimetry for New Insights in Hot Supersonic Jet Noise	3777
<i>T. Lowe, W. Ng, T. Ecker</i>	
Wind Turbine Field Measurements With Compact Microphone Array Using Advanced Beamforming Methods	3792
<i>R. Ramachandran, G. Raman, R. Dougherty</i>	
Characterization of the In-flight Unsteady Pressure Field at the Exhaust of a Turbofan Engine by Means of Advanced Measurement and Data Analysis Techniques	3805
<i>Angelot Minotti</i>	
An Extended Formulation of the SODIX Method with Application to Aeroengine Broadband Noise	3818
<i>Stefan Funke, Alexander Skorpel, Ulf Michel</i>	
Separation of Hydrodynamic Perturbations in Acoustic Liner Insertion Loss Measurements at a Fan Rig	3830
<i>Roland Bauers, Ulf Tapken</i>	
Simulation of a Generic Two-Wheel Nose Landing Gear Using High-order Finite Difference Schemes	3846
<i>Wen Liu, Jae Wook Kim, Xin Zhang, Bastien Caruelle</i>	
Numerical Simulation of a Two-Wheel Main Landing Gear with Low-Noise Fairings around Tire-Axle Region	3865
<i>Mitsuhiro Murayama, Yuzuru Yokokawa, Kazuomi Yamamoto, Tohru Hirai</i>	
Aeroacoustic Simulation of a Nose Landing Gear in an Open Jet Facility using FUN3D	3884
<i>Veer Vatsa, David Lockard, Mehdi Khorrami, Jan-Renee Carlson</i>	
LAGOON: New Mach Landing Gear Noise Computation and Further Analysis of the CAA Process	3902
<i>Laurent Sanders, Eric Manoha, Saloua Ben Khelil, Christophe Francois</i>	
Numerical Investigation of Massively Separated Flows Past RLG Using Advanced DES Approaches	3919
<i>Zhixiang Xiao, Jian Liu, China; Kunyu Luo, Jingbo Huang, Song Fu</i>	
Hybrid CAA Solutions for Nose Landing Gear Noise	3943
<i>F. Vuillot, N. Lupoglazoff, D. Luquent, L. Sanders, E. Manoha, S. Redonnet</i>	
Aeroacoustic Analysis of the Rudimentary Landing Gear Using Octree Unstructured Grid with Boundary-fitted Layer	3961
<i>Yosuke Ueno, Taku Nagata, Akio Ochi, Kenji Hayama</i>	
Time Reversal Method Coupled to Complex Differentiation Technique for the Aeroacoustic Sourcedetection in Viscous Flow	3973
<i>Philippe Druault, Regis Marchiano, Pierre Sagaut</i>	
Comparison of Computational Aeroacoustics Prediction of Acoustic Transmission through a Loaded 2D Rotor with Flat Plate Theory	3981
<i>Ray Hixon</i>	
Advanced Noise Control Fan Direct Aeroacoustics Predictions Using a Lattice-Boltzmann Method	3993
<i>A. Mann, F. Perot, M. Kim, D. Casalino, E. Fares</i>	
Grid Sensitivity of the Rudimentary Landing Gear Using Unstructured Finite Volume Methods	4012
<i>Chad Winkler, Andrew Dorgan, Mortaza Mani, Jon Vegard Larssen, Robin Langtry</i>	
Scale-Resolving Simulation of an Unsteady Turbulent Flow and Acoustic Field of a Screeching Supersonic Jet	4029
<i>Konstantin Kurbatskii</i>	
NREL Wind Turbine Aerodynamics Validation and Noise Predictions Using a Lattice Boltzmann Method	4040
<i>Franck Perot, Min-Suk Kim, Mohammed Meskine, David Freed</i>	
Folded Cavity Liners for Turbofan Engine Intakes	4053
<i>Rie Sugimoto, Paul Murray, R. Jeremy Astley</i>	
Linearized Navier-Stokes and Euler Equations for the Determination of the Acoustic Scattering Behaviour of an Area Expansion	4066
<i>J. Gikadi, M. Schulze, J. Schwing, S. Foeller, T. Sattelmayer</i>	
Aero-acoustic Simulations of an Orifice in a Low-mach-number Ducted Flow	4076
<i>Ciarán O'Reilly, Emma Alenius, Gunilla Efraimsson, Daniel Bodony</i>	
Development of a Single Degree of Freedom Perforate Impedance Model Under Grazing Flow and High SPL	4086
<i>Paul Murray, R. Jeremy Astley</i>	
Grazing Flow Wedge Resonator Impedance Model	4097
<i>Alan Hersh, Michael Jones, Willie Watson, Sean Reilly</i>	
Uncertainty Analysis of the Grazing Flow Impedance Tube	4125
<i>Martha Brown, Michael Jones, Willie Watson</i>	
Turbulent Statistics from Time-Resolved PIV Measurements of a Jet Using Empirical Mode Decomposition	4138
<i>Milo Dahl</i>	
On the Effect of Mach Number and Coflow for Turbulent Jet Noise Sources	4158
<i>Sergey Karabasov, Richard Sandberg</i>	

The Impact of Twin Jets on Airport Noise	4171
<i>Richard Bozak</i>	
Jet Noise Reduction Using Microjet Configurations Experimental Characterization in CEPRA19 Anechoic Wind Tunnel	4182
<i>Nozomi Tanaka, Tsutomu Oishi, Olivier Piccin, Denis Gely, Kazuomi Yamamoto, Shunji Enomoto</i>	
Experimental Study of a Claw Mixer	4196
<i>Tatsuya Ishii, Hideshi Oinuma, Kenichiro Nagai, Satoru Nakamura, Yutaka Ishii</i>	
Trailing Edge Noise Prediction for Rotating Blades:analysis and Comparison of Two Classical Approaches	4219
<i>Samuel Sinayoko, Michael Kingan, Anurag Agarwal</i>	
Open-rotor Noise Prediction with a RANS-informed Analytical Method	4239
<i>Sebastien Guerin, Antoine Moreau, Christoph Menzel, Christian Weckmueller</i>	
Open Rotor Broadband Interaction Noise	4253
<i>M. Kingan</i>	
Investigation on Turbine Tone Broadening in Static Engines	4273
<i>Adolfo Serrano, Raúl Vázquez, Alastair Moore</i>	
Verification of the Inverse Cut-off Effect in a Turbomachinery Stage - Part I - Numerical Results	4291
<i>D. Broszat, T. Selic, A. Marn</i>	
Camber Effects in Cascade-gust Interaction Noise Through a Simple Extension of Analytical Models	4300
<i>Vincent Blandeau, Thomas Node-Langlois, Jérôme De Laborderie, Laurent Soulat, Stephane Moreau, Helene Posson</i>	
Broadband Noise Analysis of a Rotor-Stator-Cascade Using Wall Modeled LES Simulation	4322
<i>Björn Greschner, F. Thiele</i>	
On the Linearity of Turbomachinery Interaction Noise. Part II: 3D Analysis	4335
<i>Jose Ramon Fernandez Aparicio, Adolfo Serrano, Raúl Vázquez</i>	
A Novel Concept of Active Combustion Instability Control in Solid Rocket Motors through H₂O₂ Capillary Injection	4353
<i>Nanda Kulkarni, Sudarshan Kumar</i>	
Author Index	