AdvancEd aicRaft-noIse-AlLeviation devIceS using meTamaterials

Résultats

Informations projet

AERIALIST

N° de convention de subvention: 723367

Site Web du projet

DOI
10.3030/723367

Projet clôturé

Date de signature de la CE
21 Mars 2017

Date de début
1 Juin 2017

Date de fin
31 Mai 2020

Financé au titre de
SOCIETAL CHALLENGES - Smart, Green And Integrated Transport

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Contribution de l'UE
€ 2 424 330,00

Coordonné par
UNIVERSITA DEGLI STUDI ROMA TRE
Italy

CORDIS fournit des liens vers les livrables publics et les publications des projets HORIZON.

Les liens vers les livrables et les publications des projets du 7e PC, ainsi que les liens vers certains types de résultats spécifiques tels que les jeux de données et les logiciels, sont récupérés dynamiquement sur OpenAIRE.

Livrables

Documents, reports (19)

Status of dissemination activity at M24

Update of the status of dissemination activity, including the list of journal papers submitted, contribution to international conferences, internal and public seminars. Update to the status of deliverables and use of resources. Update to the IPR management report.

Deliverable status and use of resources

Status of deliverables and use of resources. Includes IPR management report.

Theoretical models for MM integration in aeroacoustics

Report of the general theory for the aeroacoustic integration of metamaterial, and the computed properties for transmission in bulk metamaterials associated to all the basic material concepts analysed (e.g., anisotropic, periodic/layered, poro-elastic, fractal,...). Restriction to idealized 2D problems (metasurfaces) for the modelling of surface treatments, such as liners or coatings.

Definition of pseudo-impedance from MM properties

Definition of pseudo-impedance and relationship to detailed material properties and structure, including strategies for its numerical implementation in BEM and FEM codes.

Final report

Final report, including the update of the status of dissemination activity. Update of the IPR management report.

Midterm report

Midterm report, including - update of the status of dissemination activity - the topic, title, scheduled date and venue of the final workshop - use of resources - status of deliverables Update of IPR management report.

Simulation of benchmark problems

Simulation of benchmark problems. Possibly, all the numerical tools available to the consortium will be used. Validation of the results against literature and/or analytical references.

Guidelines for meta material design and manufacture

Guidelines for meta material design and manufacture including a report on innovative manufacturing processes. The report covers technologies and techniques investigated during the project.

SoA @ M12

Update of the SoA at M12. Includes update of granted patents.

Status of dissemination activity

Status of dissemination activity, including the list of journal papers submitted, contribution to international conferences, internal and public seminars. Update to the status of deliverables and use of resources. Update of IPR management report.

Technical feasibility report and development roadmap to TRL 6

Report on the technical feasibility of the most promising concepts and development recommendations to increase the technology to TRL 6 within the horizon of 2030. The report will include the results of early simulations of the MM devices in realistic operating conditions and tentative design criteria for the integration into future generations of aircraft.

SoA @ M24

Update of the state-of-the-art at M24. Includes update on the patents granted on relevant topics.

SoA @ M4 and reference problem description

Report on the state-of-the-art at M4 and description of the benchmark problem selected in the literature as reference test case. The report will include details for the accurate reproduction of the benchmark problem in both computer simulations and laboratory experiments. The deliverable also includes the initial survey of existing patents on relevant topics.

Deliverable status and use of resources at M30

Update to the status of deliverables and use of resources. Final workshop announcement. Update of IPR management report.

Description of analytical benchmark solutions

Description of exact and approximated benchmark solutions for propagation over: i) an infinite planar metamaterial, ii) in two dimensions round a finite body, iii) in three dimensions for axisymmetric body.

Final data processing

Final data processing for the whole AERIALIST flow and noise experimental campaign. Data will be made available in a readable format suitably defined in the deliverable.

Simulation of experiments

Simulation of experiments. Report on validation calculations for experimental setups, including the relationship of theoretical properties with measurable data obtained from experiments or simulations. Depends on D2.4.

Test procedures for meta material

Test procedures for meta material characterisation and validation.

SoA @ M30

Update of the state-of-the-art at M30. Includes update on the patents granted on relevant topics.

Other (2)

Measurements of the AERIALIST concepts

Aeroacoustic measurements of the AERIALIST concepts for both test rigs. The deliverable will provide the aeroacoustic measures in an open format, either chosen among those available or defined ad hoc for the project. In the latter case, the deliverable will include format specifications.

Measurements of the benchmark concept

Aeroacoustic measurements of the benchmark concept.

Publications

Peer reviewed articles (11)

Design of a Kelvin cell acoustic metamaterial

Auteurs: H. J. Rice, J. Kennedy, P. Göransson, L. Dowling, D. Trimble
Publié dans: Journal of Sound and Vibration, Numéro 472, 2020, Page(s) 115167, ISSN 0022-460X
Éditeur: Academic Press
DOI: 10.1016/j.jsv.2019.115167

Design of metacontinua in the aeroacoustic spacetime

Auteurs: Umberto Iemma, Giorgio Palma
Publié dans: Scientific Reports, Numéro 10/1, 2020, ISSN 2045-2322
Éditeur: Nature Publishing Group
DOI: 10.1038/s41598-020-74304-5

On the Use of the Analogue Transformation Acoustics in Aeroacoustics

Auteurs: Umberto Iemma, Giorgio Palma
Publié dans: Mathematical Problems in Engineering, Numéro 2017, 2017,

Page(s) 1-16, ISSN 1024-123X
Éditeur: Hindawi Publishing Corporation
DOI: 10.1155/2017/8981731

Acoustic Metamaterials in Aeronautics
Auteurs: Giorgio Palma, Huina Mao, Lorenzo Burghignoli, Peter Göransson, Umberto Iemma
Publié dans: Applied Sciences, Numéro 8/6, 2018, Page(s) 971, ISSN 2076-3417
Éditeur: MDPI
DOI: 10.3390/app8060971

Convective correction of metafluid devices based on Taylor transformation
Auteurs: Umberto Iemma, Giorgio Palma
Publié dans: Journal of Sound and Vibration, Numéro 443, 2019, Page(s) 238-252, ISSN 0022-460X
Éditeur: Academic Press
DOI: 10.1016/j.jsv.2018.11.047

An inverse method for characterisation of the static elastic Hooke's tensors of solid frame of anisotropic open-cell materials
Auteurs: Huina Mao, Romain Rumpler, Peter Göransson
Publié dans: International Journal of Engineering Science, Numéro 147, 2020, Page(s) 103198, ISSN 0020-7225
Éditeur: Elsevier BV
DOI: 10.1016/j.ijengsci.2019.103198

An inverse method for design and characterisation of acoustic materials
Auteurs: Huina Mao, Romain Rumpler, Peter Göransson
Publié dans: MATEC Web of Conferences, Numéro 304, 2019, Page(s) 02002, ISSN 2261-236X
Éditeur: MATEC Web of Conferences
DOI: 10.1051/matecconf/201930402002

The Influence of Additive Manufacturing Processes on the Performance of a Periodic Acoustic Metamaterial
Auteurs: John Kennedy, Lara Flanagan, Luke Dowling, G. J. Bennett, Henry Rice, Daniel Trimble
Publié dans: International Journal of Polymer Science, Numéro 2019, 2019, Page(s) 1-11, ISSN 1687-9422
Éditeur: Hindawi
DOI: 10.1155/2019/7029143

A review of critical repeatability and reproducibility issues in powder bed fusion

Auteurs: L. Dowling, J. Kennedy, S. O'Shaughnessy, D. Trimble
Publié dans: Materials & Design, Numéro 186, 2020, Page(s) 108346, ISSN 0264-1275
Éditeur: Elsevier BV
DOI: 10.1016/j.matdes.2019.108346

Twist, tilt and stretch: From isometric Kelvin cells to anisotropic cellular materials
Auteurs: Huina Mao, Romain Rumpler, Mathieu Gaborit, Peter Göransson, John Kennedy, Daragh O'Connor, Daniel Trimble, Henry Rice
Publié dans: Materials & Design, 2020, Page(s) 108855, ISSN 0264-1275
Éditeur: Elsevier BV
DOI: 10.1016/j.matdes.2020.108855

Closed-Form Evaluation of Potential Integrals in the Boundary Element Method
Auteurs: Michael Carley
Publié dans: Journal of Theoretical and Computational Acoustics, Numéro Vol. 28, No. 02, 2019, Page(s) 1950014, ISSN 2591-7811
Éditeur: World Scientific Publishing Co.
DOI: 10.5281/zenodo.4081290

Conference proceedings (12)

AEROACOUSTIC DESIGN OF METAFLUID DEVICES
Auteurs: Umberto Iemma, Giorgio Palma
Publié dans: 24th International Congress on Sound and Vibration, ICSV 2017, 2017
Éditeur: International Institute of Acoustics and Vibration, IIAV
DOI: 10.5281/zenodo.3871764

Analogue Transformation Acoustics in Aeronautics
Auteurs: Umberto Iemma and Giorgio Palma
Publié dans: Proceedings of INTERNOISE 2017, 2017
Éditeur: International Institute of Noise Control Engineering
DOI: 10.5281/zenodo.3871557

ON AEROACOUSTIC SPACE-TIME CURVATURE FOR CERTAIN AERODYNAMIC FLOWS
Auteurs: Umberto Iemma
Publié dans: 25th International Congress on Sound and Vibration, ICSV 2018, 2018
Éditeur: International Institute of Sound and Vibration, IIAV

NUMERICAL ACOUSTIC CHARACTERISATION OF A KELVIN CELL STRUCTURE UNDER NORMAL AND GRAZING INCIDENCE

Auteurs: Umberto Iemma, Giorgio Palma, Lorenzo Burghignoli, Henry Rice
Publié dans: 25th International Congress on Sound and Vibration, ICSV 2018, 2018
Éditeur: International Institute of Sound and Vibration
DOI: 10.5281/zenodo.3871518

SPACETIME-BENDING TRANSFORMATIONS IN AEROACOUSTICS

Auteurs: Palma, Giorgio; Iemma, Umberto
Publié dans: 26th International Congress on Sound and Vibration 2019, ICSV 2019, Numéro 12, 2019
Éditeur: Canadian Acoustical Association
DOI: 10.5281/zenodo.3871539

OPTIMIZATION OF METASURFACES FOR THE DESIGN OF NOISE TRAPPING METADEVICES

Auteurs: Palma, Giorgio; Iemma, Umberto
Publié dans: 26th International Congress on Sound and Vibration 2019, ICSV 2019, Numéro 11, 2019
Éditeur: Canadian Acoustical Association
DOI: 10.5281/zenodo.3871535

A combined design-manufacturing-testing investigation of micro- To macro-scale tailoring of open poroelastic materials based on perturbed Kelvin cell micro-geometries

Auteurs: Dowling, L., Mao, H., Flanagan, L., Kennedy, J., Cuenca, J., Rice, H., Trimble, D., Göransson, P.
Publié dans: Proceedings of ISMA 2018 - International Conference on Noise and Vibration Engineering and USD 2018 - International Conference on Uncertainty in Structural Dynamics, 2018, Page(s) 1163-1177, ISBN 9789-073802995
Éditeur: KU Leuven - Departement Werktuigkunde

The use of a benchmark periodic metamaterial to inform numerical modelling and additive manufacturing approaches

Auteurs: L. Dowling , L. Flanagan , H. Rice , D. Trimble , J. Kennedy
Publié dans: Proceedings of ISMA 2018 - International Conference on Noise and Vibration Engineering and USD 2018 - International Conference on Uncertainty in Structural Dynamics, 2018, Page(s) 1105-1120, ISBN 9789-073802995
Éditeur: KU Leuven - Departement Werktuigkunde

Design of a Kelvin cell acoustic metamaterial

Auteurs: H. Rice, J. Kennedy, Göransson P.
Publié dans: Proceedings of ISMA 2018 - International Conference on Noise and Vibration Engineering and USD 2018 - International Conference on Uncertainty in Structural Dynamics, 2018, Page(s) 1081-1090, ISBN 9789-073802995
Éditeur: KU Leuven - Departement Werktuigkunde

An Investigation On Neck Extensions For Single and Multi-Degree of Freedom Acoustic Helmholtz Resonators
Auteurs: Gautam A., Celik A., Azarpeyvand M.
Publié dans: 2020 AIAA AVIATION Forum, 2020
Éditeur: AIAA AVIATION Forum

Double Degree of Freedom Helmholtz Resonator Based Acoustic Liners
Auteurs: Gautam A., Celik A., Azarpeyvand M.
Publié dans: 2020 AIAA AVIATION Forum, 2020
Éditeur: AIAA Aviation Forum

Steering of Acoustic Reflection from Metasurfaces through Numerical Optimization
Auteurs: Palma Giorgio, Centracchio Francesco, Burghignoli Lorenzo, Iemma Umberto, Cioffi Ilaria
Publié dans: 25th AIAA/CEAS Aeroacoustics Conference, Numéro AIAA 2019-2400, 2019, ISBN 978-1-62410-588-3
Éditeur: American Institute of Aeronautics and Astronautics Inc, AIAA
DOI: 10.5281/zenodo.4081276

Thesis and dissertations (1)

Aeroacoustics of metacontinua
Auteurs: Giorgio Palma
Publié dans: 2020
Éditeur: -
DOI: 10.5281/zenodo.4045513

Autres produits de recherche

Autres produits de recherche via OpenAire (2)

Aeroacoustics of metacontinua

Auteurs: Palma, Giorgio
Publié dans: Zenodo

COMSOL Multiphysics setup files for simulation of convective correction of a metafluid device.

Auteurs: Iemma, Umberto; Palma, Giorgio
Publié dans: Zenodo

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Permalink: https://cordis.europa.eu/project/id/723367/results/fr