Algebraic Representations in Computer-Aided Design for complEx Shapes

Risultati

Informazioni relative al progetto

ARCADES

ID dell'accordo di sovvenzione: 675789

DOI
10.3030/675789

Progetto chiuso

Data della firma CE
28 Luglio 2015

Data di avvio
1 Gennaio 2016

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€ 3 408 202,08

Coordinato da
ATHINA-EREVNITIKO KENTRO KAINOTOMIAS STIS TECHNOLOGIES TIS PLIROFORIAS, TON EPIKOINONION KAI TIS GNOSIS
Grecia

CORDIS fornisce collegamenti ai risultati finali pubblici e alle pubblicazioni dei progetti ORIZZONTE.

I link ai risultati e alle pubblicazioni dei progetti del 7° PQ, così come i link ad alcuni tipi di risultati specifici come dataset e software, sono recuperati dinamicamente da .OpenAIRE.

Risultati finali

Altro (8)

Software and Industrial Workshops

Software and Industrial Workshop I (Month 21). Software and Industrial Workshop II (Month 36).

ARDACDES Certificate and Doctoral degrees

Awarding of ARCADES Certificate, recognized by all participants, listing all aspects of training undertaken by the ESR within ARCADES. Awarding of doctoral degrees of those ESRs who have completed their PhD Theses according to local rules.

Learning Weeks

Learning Week I (Month 15), Learning Week II (month 26) and Learning Week III (Month 42) for Network-wide Complementary skills training.

Kickoff Workshop & Recruitment Event

Network Kickoff workshop, and Recruitment event.

Advertisement of ESR openings

Advertisement of ESR positions and the recruitment event using the project's and the Euraxess webportals, emailing lists and social networks, and printed material such as posters, leaflets, etc.

Doctoral Schools and ESR workshop

Doctoral School I (Month 9), Doctoral School II (Month 31), and Workshop (Month 31) organised by the ESRs. The latter two events are consecutive and co-located. All events are Network-wide.

Final Open Conference, and Career Fair

Open international Conference (WP6, Evolute) with emphasis on dissemination, and Career Fair (WP5, INRIA).

Midterm Review Meeting

Midterm review meeting.

Documenti, relazioni (11)

1st scientific advances report on WP1

1st scientific advances report: state of the art, research organisation and first results. Task 1.1 Adaptive algebraic representations (ESR1): New, adaptive and efficient implicit representation of parametric, and point-cloud models. Task 1.2 Locally refined approximate implicitisation (ESR9): Bivariate approximate

implicitisation using LR B-splines. Task 1.3 Constraint formulation and computing with constraint varieties at interactive rates (ESR12): Interactive modelling with developable NURBS surfaces. Task 1.4 Constrained geometry for fabrication (ESR13): Computational design of pattern-like arrangements and support structures in equilibrium.

1st scientific advances report on WP2

1st scientific advances report: state of the art, research organisation and first results. Task 2.1 Refinement strategies for LR-splines (ESR8): First results on refinement strategies and linear independence. Task 2.2 Parametric modelling of complex shapes (ESR5): Analysis and construction of Gk splines on domains with arbitrary topology. Task 2.3 Integrating novel shape representations with Isogeometric Analysis (ESR11): CADfix-aligned T/LR-spline based IGA-BEM solver with applications in ship-system hydrodynamics. Task 2.4 Integration and evaluation of novel parametric modellers tools for design optimisation (ESR10): T-spline based parametric modellers that can handle smoothness, interpolation and shape-preservation constraints.

Draft 1st Periodic report

Report on advances in research, training, dissemination, and management. The basis for the midterm review.

Research data

This deliverable describes how the Project generates and/or collects research data and its policy towards providing open access to these data.

Scientific Publications

Publication of Final Conference proceedings (ARCADES Book). Benchmarks on representations of complex data: Chapters in ARCADES Book and Webportal. Journal publications, conference presentations, technical reports, prototype software.

1st scientific advances report on WP3

1st scientific advances report: state of the art, research organisation, and first results. Task 3.1 Control structures for motion design (ESR7): State of the art and performance comparisons of known approaches, possibly new approaches, if sufficiently developed, in motion design. Task 3.2 Skeleton-based design of surfaces (ESR6): Formulation and experimentation of topologically accurate convolution surfaces for skeletons made of arcs of circles and line segments. Task 3.3 Singularities and syzygies of parameterisations (ESR3): Familiarity with methods already known to compute invariants of parameterisations by exploiting syzygies and singularities, and implementations to use these ideas in an efficient and fast way. Task 3.4 Distance to NURBS curves and surfaces (ESR4): New method based on matrix representations for determining all the closest points to a

single Bezier patch. Task 3.5 Path planning and workspace modelling (ESR2): Design of adaptive algebraic algorithms to model the workspace of mechanisms.

Final project report

Report on achievements and advances in all aspects of the project, namely research, training, dissemination, and management.

2nd scientific advances report on WP2

2nd scientific advances report: results and transfer. Task 2.1 Refinement strategies for LR-splines (ESR8): Refinement strategies for big data approximation. Task 2.2 Parametric modelling of complex shapes (ESR5): Extensions and applications of Gk-splines for modeling and simulation. Task 2.3 Integrating novel shape representations with Isogeometric Analysis (ESR11): 3D volumetric meshing of complex computational domains arising in ship hydrodynamic applications. Task 2.4 Integration and evaluation of novel parametric modellers tools for design optimisation (ESR10): T-spline based parametric modellers and their use for ship-system optimisation.

2nd scientific advances report on WP3

2nd scientific advances report: results and transfer. Task 3.1 Control structures for motion design (ESR7): New approaches in motion design and related aspects. Task 3.2 Skeleton-based design of surfaces (ESR6): Approximate parameterisation of topologically accurate convolution surfaces. Task 3.3 Singularities and syzygies of parameterisations (ESR3): Development of new algebro-geometrical connections between invariants of curves and surfaces and singularities of their parameterisations, and also implementation of them. Task 3.4 Distance to NURBS curves and surfaces (ESR4): New method for solving the closest point problem for a complete NURBS model and its application to surface fitting. Task 3.5 Path planning and workspace modelling (ESR2): Development of tools for path planning using sparse and motion polynomials.

1st progress report

Detailing the project progress so far including all aspects (hiring situation, training, and management).

2nd scientific advances report on WP1

2nd scientific advances report: results and transfer. Task 1.1 Adaptive algebraic representations (ESR1): Exact and approximate implicitisation from different representations, using rational and numerical methods. Task 1.2 Locally refined approximate implicitisation (ESR9): 3-variate approximate implicitization using LR B-splines. Task 1.3 Constraint formulation and computing with constraint varieties at interactive rates (ESR12): Understanding fast projection onto constraint varieties using a simplified algebraic structure. Task 1.4 Constrained

geometry for fabrication (ESR13): Computing constrained curves on surfaces related to manufacturing.

Pubblicazioni

Articoli sottoposti a revisione paritaria (21)

Graphs with Flexible Labelings
Autori: Georg Grasegger, Jan Legerský, Josef Schicho
Pubblicato in: Discrete & Computational Geometry, 2018, ISSN 0179-5376
Editore: Springer Verlag
DOI: 10.1007/s00454-018-0026-9

Scaffolding skeletons using spherical Voronoi diagrams: Feasibility, regularity and symmetry
Autori: A.J. Fuentes Suárez, E. Hubert
Pubblicato in: Computer-Aided Design, Numero 102, 2018, Pagina/e 83-93, ISSN 0010-4485
Editore: Pergamon Press Ltd.
DOI: 10.1016/j.cad.2018.04.016

Regularity of bicyclic graphs and their powers
Autori: Yairon Cid-Ruiz, Sepehr Jafari, Navid Nemati, Beatrice Picone
Pubblicato in: Journal of Algebra and Its Applications, 2019, Pagina/e 2050057, ISSN 0219-4988
Editore: World Scientific
DOI: 10.1142/s0219498820500577

Optimizing B-spline surfaces for developability and paneling architectural freeform surfaces
Autori: Konstantinos Gavriil, Alexander Schiftner, Helmut Pottmann
Pubblicato in: Computer-Aided Design, Numero 111, 2019, Pagina/e 29-43, ISSN 0010-4485
Editore: Pergamon Press Ltd.
DOI: 10.1016/j.cad.2019.01.006

Multiplicity of the saturated special fiber ring of height two perfect ideals
Autori: Yairon Cid-Ruiz
Pubblicato in: Proceedings of the American Mathematical Society, Numero 148/1, 2020, Pagina/e 59-70, ISSN 0002-9939
Editore: American Mathematical Society
DOI: 10.1090/proc/14693

Bounding the degrees of a minimal μ-basis for a rational surface parametrization
Autori: Yairon Cid-Ruiz
Pubblicato in: Journal of Symbolic Computation, Numero 95, 2019, Pagina/e 134-150, ISSN 0747-7171
Editore: Academic Press
DOI: 10.1016/j.jsc.2019.02.003

Curved optimal delaunay triangulation
Autori: Leman Feng, Pierre Alliez, Laurent Busé, Hervé Delingette, Mathieu Desbrun
Pubblicato in: ACM Transactions on Graphics, Numero 37/4, 2018, Pagina/e 1-16, ISSN 0730-0301
Editore: Association for Computing Machinary, Inc.
DOI: 10.1145/3197517.3201358

Anisotropic convolution surfaces
Autori: Alvaro Javier Fuentes Suarez, Evelyne Hubert, Cedric Zanni
Pubblicato in: Computers & Graphics, Numero 82, 2019, Pagina/e 106-116, ISSN 0097-8493
Editore: Pergamon Press Ltd.
DOI: 10.1016/j.cag.2019.05.018

Implicit representations of high-codimension varieties
Autori: Ioannis Z. Emiris, Christos Konaxis, Clément Laroche
Pubblicato in: Computer Aided Geometric Design, Numero 74, 2019, Pagina/e 101764, ISSN 0167-8396
Editore: Elsevier BV
DOI: 10.1016/j.cagd.2019.07.003

On the maximal number of real embeddings of minimally rigid graphs in R 2 , R
Autori: Evangelos Bartzos, Ioannis Z. Emiris, Jan Legerský, Elias Tsigaridas
Pubblicato in: Journal of Symbolic Computation, 2019, ISSN 0747-7171
Editore: Academic Press
DOI: 10.1016/j.jsc.2019.10.015

Graphs with flexible labelings allowing injective realizations
Autori: Georg Grasegger, Jan Legerský, Josef Schicho
Pubblicato in: Discrete Mathematics, 2019, Pagina/e 111713, ISSN 0012-365X
Editore: Elsevier BV
DOI: 10.1016/j.disc.2019.111713

Implicitizing rational curves by the method of moving quadrics
Autori: Laurent Busé, Clément Laroche, Fatmanur Yıldırım
Pubblicato in: Computer-Aided Design, Numero 114, 2019, Pagina/e 101-111,

ISSN 0010-4485
Editore: Pergamon Press Ltd.
DOI: 10.1016/j.cad.2019.05.019

The Rees algebra of parametric curves via liftings
Autori: Teresa Cortadellas Benítez, David A. Cox, Carlos D'Andrea
Pubblicato in: Journal of Pure and Applied Algebra, Numero 224/2, 2020, Pagina/e 869-893, ISSN 0022-4049
Editore: Elsevier BV
DOI: 10.1016/j.jpaa.2019.06.015

Transfinite mean value interpolation over polygons
Autori: Michael S. Floater, Francesco Patrizi
Pubblicato in: Numerical Algorithms, 2018, ISSN 1017-1398
Editore: Baltzer Science Publishers B.V.
DOI: 10.1007/s11075-019-00849-w

Void Filling of Digital Elevation Models With Deep Generative Models
Autori: Konstantinos Gavriil, Georg Muntingh, Oliver J. D. Barrowclough
Pubblicato in: IEEE Geoscience and Remote Sensing Letters, Numero 16/10, 2019, Pagina/e 1645-1649, ISSN 1545-598X
Editore: Institute of Electrical and Electronics Engineers
DOI: 10.1109/LGRS.2019.2902222

Linear dependence of bivariate Minimal Support and Locally Refined B-splines over LR-meshes
Autori: Francesco Patrizi, Tor Dokken
Pubblicato in: Computer Aided Geometric Design, Numero 77, 2020, Pagina/e 101803, ISSN 0167-8396
Editore: Elsevier BV
DOI: 10.1016/j.cagd.2019.101803

G 1 -smooth splines on quad meshes with 4-split macro-patch elements
Autori: Ahmed Blidia, Bernard Mourrain, Nelly Villamizar
Pubblicato in: Computer Aided Geometric Design, Numero 52-53, 2017, Pagina/e 106-125, ISSN 0167-8396
Editore: Elsevier BV
DOI: 10.1016/j.cagd.2017.03.003

A T-splines-based parametric modeller for computer-aided ship design
Autori: T. Katsoulis, X. Wang, P.D. Kaklis
Pubblicato in: Ocean Engineering, Numero 191, 2019, Pagina/e 106433, ISSN 0029-8018
Editore: Pergamon Press Ltd.
DOI: 10.1016/j.oceaneng.2019.106433

Geometrically smooth spline bases for data fitting and simulation
Autori: Ahmed Blidia, Bernard Mourrain, Gang Xu
Pubblicato in: Computer Aided Geometric Design, Numero 78, 2020, Pagina/e 101814, ISSN 0167-8396
Editore: Elsevier BV
DOI: 10.1016/j.cagd.2020.101814

Discretizations of Surfaces with Constant Ratio of Principal Curvatures
Autori: Michael R. Jimenez, Christian Müller, Helmut Pottmann
Pubblicato in: Discrete & Computational Geometry, 2019, ISSN 0179-5376
Editore: Springer Verlag
DOI: 10.1007/s00454-019-00098-7

Scaffolding skeletons using spherical Voronoi diagrams
Autori: A.J. Fuentes Suárez, E. Hubert
Pubblicato in: Electronic Notes in Discrete Mathematics, Numero 62, 2017, Pagina/e 45-50, ISSN 1571-0653
Editore: Elsevier BV
DOI: 10.1016/j.endm.2017.10.009

Altro (14)

A D-module approach on the equations of the Rees algebra
Autori: Yairon Cid Ruiz
Pubblicato in: J. Commut. Algebra, 2019
Editore: Rocky Mountain Mathematics Consortium

Regularity and Gröbner bases of the Rees algebra of edge ideals of bipartite graphs
Autori: Yairon Cid-Ruiz
Pubblicato in: LE MATEMATICHE, Numero Vol. LXXIII (2018) – Fasc. II, 2018, Pagina/e pp. 279–296
Editore: LE MATEMATICHE
DOI: 10.4418/2018.73.2.4

Degree and birationality of multi-graded rational maps
Autori: Busé , Laurent; Cid-Ruiz , Yairon; D 'andrea , Carlos
Pubblicato in: Proc. Lond. Math. Soc. To appear, 2018
Editore: London Mathematical Society

Minimal solutions of the rational interpolation problem
Autori: Benitez, Teresa Cortadellas; D'Andrea, Carlos; Montoro, Eulalia
Pubblicato in: Revista de la Unión Matemática Argentina, 2018

Editore: http://www.union-matematica.org.ar/

Classification of motions of the 3-connected Harary graph on 7 vertices
Autori: Grasegger, Georg; Legerský, Jan; Schicho, Josef
Pubblicato in: Numero 11, 2019
Editore: zenodo.org
DOI: 10.5281/zenodo.3561921

Degree of rational maps via specialization
Autori: Cid-Ruiz, Yairon; Simis, Aron
Pubblicato in: 2019
Editore: http://arxiv.org/

Fibers of multi-graded rational maps and orthogonal projection onto rational surfaces
Autori: Botbol, Nicolás; Busé, Laurent; Chardin, Marc; Yildirim, Fatmanur
Pubblicato in: https://hal.inria.fr/hal-02112357, 2019
Editore: https://hal.inria.fr/

Reverse engineering of CAD models via clustering and approximate implicitization
Autori: Raffo, Andrea; Barrowclough, Oliver J. D.; Muntingh, Georg
Pubblicato in: 2018
Editore: http://arxiv.org/

Weighted Quasi Interpolant Spline Approximation of 3D point clouds via local refinement
Autori: Raffo, Andrea; Biasotti, Silvia
Pubblicato in: 2019
Editore: http://arxiv.org/

Weighted Quasi Interpolant Spline Approximations: Properties and Applications
Autori: A. Raffo, S. Biasotti
Pubblicato in: 2019
Editore: https://arxiv.org

Adaptive refinement with locally linearly independent LR B-splines: Theory and Applications
Autori: F. Patrizi, C. Manni, F. Pelosi, H. Speleers
Pubblicato in: 2019
Editore: https://arxiv.org/abs/

On the existence of paradoxical motions of generically rigid graphs on the sphere
Autori: M. Gallet, G. Grasegger, J. Legerský, J. Schicho.
Pubblicato in: 2019
Editore: https://arxiv.org/abs/

"Source code and examples for the paper ""On the multihomogeneous Bézout bound on the number of embeddings of minimally rigid graphs""""
Autori: Bartzos Evangelos; Schicho Josef
Pubblicato in: 2019
Editore: https://zenodo.org/
DOI: 10.5281/zenodo.3542061

Interpolation of syzygies for implicit matrix representations
Autori: Emiris, Ioannis; Gavriil, Konstantinos; Konaxis, Christos
Pubblicato in: https://hal.inria.fr/hal-01421866, Numero 1, 2017
Editore: https://hal.inria.fr/

Atti di conferenza (5)

Wave-Resistance Computation via CFD and IGA-BEM Solvers: A Comparative Study
Autori: X. Wang, S. Chouliaras, P. Kaklis, A-A. Ginnis, C. Politis, K. Kostas
Pubblicato in: Proceedings of the 27th International Ocean & Polar Engineering Conference, Numero 4, 2017, ISBN 978-1-880653-97-5
Editore: International Society of Offshore and Polar Engineers (ISOPE)
DOI: 10.5281/zenodo.1169033

Convolution Surfaces with Varying Radius: Formulae for Skeletons Made of Arcs of Circles and Line Segments
Autori: Alvaro Javier Fuentes Suárez, Evelyne Hubert
Pubblicato in: Research in Shape Analysis: WiSH2, Sirince, Turkey, June 2016, 2018, Pagina/e 37-60, ISBN 978-3-319-77066-6
Editore: Springer International Publishing
DOI: 10.1007/978-3-319-77066-6_3

On the Maximal Number of Real Embeddings of Spatial Minimally Rigid Graphs
Autori: Evangelos Bartzos, Ioannis Z. Emiris, Jan Legerský, Elias Tsigaridas
Pubblicato in: Proceedings of the 2018 ACM on International Symposium on Symbolic and Algebraic Computation - ISSAC '18, 2018, Pagina/e 55-62, ISBN 9781-450355506
Editore: ACM Press
DOI: 10.1145/3208976.3208994

Animated Motions of Exceptional Flexible Instances of Generically Rigid Graphs
Autori: Grasegger, Georg; Legerský, Jan; Schicho, Josef
Pubblicato in: BridgesLinz 2019 Conference Proceedings, Numero 11, 2019
Editore: Tessellations Publishing
DOI: 10.5281/zenodo.3518805

Matrix Representations by Means of Interpolation

Autori: Ioannis Z. Emiris, Christos Konaxis, Ilias S. Kotsireas, Clément Laroche
Pubblicato in: Proceedings of the 2017 ACM on International Symposium on Symbolic and Algebraic Computation - ISSAC '17, 2017, Pagina/e 149-156, ISBN 9781-450350648
Editore: ACM Press
DOI: 10.1145/3087604.3087629

Tesi e dissertazioni (1)

Modeling shapes with skeletons: scaffolds & anisotropic convolution

Autori: Fuentes Suárez, Alvaro Javier
Pubblicato in: Mathematics [math]. Université Côte D'Azur, 2019. English, 2019
Editore: https://hal.inria.fr/

Software

Software via OpenAIRE (4)

FlexRiLoG - SageMath package for Flexible and Rigid Labelings of Graphs

Autori: Georg Grasegger; Jan Legerský
Editore: Zenodo
DOI: 10.5281/zenodo.3078758; 10.5281/zenodo.3078757; 10.5281/zenodo.3719345

Flexible and Rigid Labelings of Graphs - supporting material

Autori: Legerský, Jan
Editore: Zenodo
DOI: 10.5281/zenodo.3079628; 10.5281/zenodo.3726814; 10.5281/zenodo.3079627

georgmuntingh/ImplicitClustering: Initial release

Autori: Andrea Raffo; Oliver Barrowclough; Georg Muntingh
Editore: Zenodo
DOI: 10.5281/zenodo.1460343; 10.5281/zenodo.1460344

Spatial graph embeddings and coupler curves - source code and results

Autori: Legerský, Jan; Bartzos, Evangelos
Editore: Zenodo
DOI: 10.5281/zenodo.1244042

Ultimo aggiornamento: 6 Settembre 2024

Permalink: https://cordis.europa.eu/project/id/675789/results/it