Roxana Bujack

Data Science at Scale Team
Los Alamos National Laboratory

(505) 876-7169
bujack@lanl.gov

EDUCATION

12/2014	Ph.D. Computer Science, Leipzig University
03/2011	B.Sc. Computer Science, Leipzig University
07/2010	Diplom (German M.Sc.) Mathematics, Leipzig University

RESEARCH EXPERIENCE

07/2016 - present	Staff Scientist, Data Science at Scale Team, Los Alamos National Laboratory
01/2016 - 07/2016	Postdoctoral Research Associate, Department of Computer Science, Technical University Kaiserlautern
01/2015 - 12/2015	Postdoctoral Research Associate, Department of Computer Science, University of California, Davis
10/2010 - 12/2014	Doctoral Research Associate, Department of Computer Science, Leipzig University

SKILLS & INTERESTS

Languages	Native fluency: German; Professional fluency: English; Working proficiency: Spanish, Russian
Programming	C++, C, Python, Java, LaTeX
Research interests	Visualization, pattern recognition, high performance computing, massive data analysis, moment invariants, vector fields, Lagrangian flow representations, Clifford analysis

HONORS

06/2016	Best Short Paper Award: EuroVis 2016
12/2014	Ph.D. with Honors "summa cum laude", Leipzig University
11/2014	Honorable Mention: IEEE VIS 2014 Poster Session
03/2014	Best Paper Award: IEEE PacificVis 2014

2016

[22] R. Bujack and A. Middel. Strategic Initiatives for Flow Visualization in Environmental Sciences. In K. Rink, A. Middel, and D. Zeckzer, editors, *Workshop on Visualisation in Environmental Sciences (EnvirVis)*, pages 23–27. The Eurographics Association, 2016

[21] M. Hummel, R. Bujack, K. I. Joy, and C. Garth. Error Estimates for Lagrangian Flow Field Representations. In E. Bertini, N. Elmqvist, and T. Wischgoll, editors, *EuroVis 2016 - Short Papers*, pages 7–11. The Eurographics Association, 2016, awarded best short paper

[20] J. Chandler, R. Bujack, and K. I. Joy. Analysis of Error in Interpolation-Based Pathline Tracing. In E. Bertini, N. Elmqvist, and T. Wischgoll, editors, *EuroVis 2016 - Short Papers*, pages 1–5. The Eurographics Association, 2016

[19] R. Bujack, M. Hlawitschka, and K. I. Joy. Topology-Inspired Galilean Invariant Vector Field Analysis. In *Proceedings of the IEEE Pacific Visualization Symposium, PacificVis 2016 in Taipei, Taiwan*, pages 72–79, 2016

2015

[18] R. Bujack and K. I. Joy. Lagrangian Representations of Flow Fields with Parameter Curves. In *Large Data Analysis and Visualization (LDAV), 2015 IEEE 4th Symposium on*. IEEE, 2015

[17] R. Bujack, G. Scheuermann, and E. Hitzer. Demystification of the Geometric Fourier Transforms and Resulting Convolution Theorems. *Mathematical Methods in the Applied Sciences*, 2015

[16] R. Bujack, J. Kasten, V. Natarajan, G. Scheuermann, and K. I. Joy. Clustering Moment Invariants to Identify Similarity within 2D Flow Fields. In E. Bertini, J. Kennedy, and E. Puppo, editors, *Eurographics Conference on Visualization (EuroVis) - Short Papers*. The Eurographics Association, 2015

[15] R. Bujack, I. Hotz, G. Scheuermann, and E. Hitzer. Moment Invariants for 2D Flow Fields via Normalization in Detail. *IEEE Transactions on Visualization and Computer Graphics (TVCG)*, 21(8):916–929, Aug 2015

[14] R. Bujack, J. Kasten, I. Hotz, G. Scheuermann, and E. Hitzer. Moment Invariants for 3D Flow Fields via Normalization. In *IEEE Pacific Visualization Symposium, PacificVis 2015 in Hangzhou, China*, 2015

2014

[13] R. Bujack. *Orientation Invariant Pattern Detection in Vector Fields with Clifford Algebra and Moment Invariants.* PhD Dissertation, Department of Computer Science, Leipzig University, Germany, 2014

[12] R. Bujack, J. Kasten, I. Hotz, G. Scheuermann, and E. Hitzer. Moment Invariants for 3D Flow Fields, 2014, awarded with an honorable mention

[11] R. Bujack, M. Hlawitschka, G. Scheuermann, and E. Hitzer. Customized TRS Invariants for 2D Vector Fields via Moment Normalization. *Pattern Recognition Letters*, 46:59, 2014

[10] R. Bujack, I. Hotz, G. Scheuermann, and E. Hitzer. Moment Invariants for 2D Flow Fields Using Normalization. In *IEEE Pacific Visualization Symposium, PacificVis 2014 in Yokohama, Japan*, 2014, awarded best paper

2013

[9] R. Bujack, G. Scheuermann, and E. Hitzer. Demystification of the Geometric Fourier Transforms. *AIP Conference Proceedings*, 1558, 2013

[8] R. Bujack, G. Scheuermann, and E. Hitzer. Detection of Outer Rotations on 3D-Vector Fields with Iterative Geometric Correlation and its Efficiency. *Advances in Applied Clifford Algebras*, pages 1–19, 2013

[7] E. Hitzer, R. Bujack, and G. Scheuermann. Vector Field Computations in Clifford's Geometric Algebra. *Third SICE Symposium on Computational Intelligence, 2013, Osaka University*, 2013

[6] R. Bujack, G. Scheuermann, and E. Hitzer. A General Geometric Fourier Transform. In E. Hitzer and S. J. Sangwine, editors, *Quaternion and Clifford Fourier Transforms and Wavelets*, Trends in Mathematics, pages 155–176. Springer Basel, 2013

[5] R. Bujack, H. De Bie, N. De Schepper, and G. Scheuermann. Convolution Products for Hypercomplex Fourier Transforms. *Journal of Mathematical Imaging and Vision*, pages 1–19, 2013

[4] R. Bujack, G. Scheuermann, and E. Hitzer. A General Geometric Fourier Transform Convolution Theorem. *Advances in Applied Clifford Algebras*, 23(1):15–38, 2013

2012	[3] R. Bujack, G. Scheuermann, and E. Hitzer. Detection of Total Rotations on linear 2D-Vector Fields with Iterative Geometric Correlation. *AIP Conference Proceedings*, 1493:190–199, 2012
	[2] R. Bujack, G. Scheuermann, and E. Hitzer. Detection of Outer Rotations on 3D-Vector Fields with Iterative Geometric Correlation. *5th conference on Applied Geometric Algebras in Computer Science and Engineering*, 2012
2011	[1] R. Bujack, G. Scheuermann, and E. Hitzer. A General Geometric Fourier Transform. In K. Gürlebeck, editor, *Proceedings of the 9th International Conference on Clifford Algebras and their Applications*, Bauhaus-University Weimar, Germany, 2011

CONFERENCE PRESENTATIONS

06/2016	EG / VGTC Conference on Visualization, Groningen, Netherlands (EuroVis 2016)
06/2016	Workshop on Visualization in Environmental Sciences (EnvirVis 2016), co-located with EuroVis 2016, Groningen, Netherlands
10/2015	5th IEEE Symposium on Large Data Analysis and Visualization co-located with IEEE VIS Chicago, IL, USA (LDAV 2015)
05/2015	EG / VGTC Conference on Visualization, Cagliari, Italy (EuroVis 2015)
04/2015	8th IEEE Pacific Visualization Symposium (PacificVis 2015), Zhejiang University, Hangzhou, China
11/2014	IEEE VIS 2014 poster session, Paris, France (VIS 2014)
03/2014	7th IEEE Pacific Visualization Symposium, Yokohama, Japan (PacificVis 2014)
09/2013	11th International Conference of Numerical Analysis and Applied Mathematics, Rodos Palace Hotel, Greece (ICNAAM 2013)
07/2012	9th International Conference on Mathematical Problems in Engineering, Aerospace and Sciences, Vienna University of Technology, Austria (ICNPAA 2012)
07/2012	Applied Geometric Algebras in Computer Science and Engineering, University of La Rochelle, France (AGACSE 2012)

07/2011	9th International Conference on Clifford Algebras and their Applications, Bauhaus-University Weimar, Germany (ICCA9)

INVITED TALKS

02/2016	Seminar: "Moment Invariants in Flow Visualization", Information Science & Technology Institute (ISTI), Los Alamos National Laboratory, Los Alamos, NM, USA
10/2015	Seminar: "Features in Scientific Visualization", General Meeting of the International Research Training Group "Physical Modeling for Virtual Manufacturing Systems and Processes" (IRTG 2057), Monterey, CA, USA
09/2015	Seminar: "Moment Invariants in Flow Visualization", Scientific Computing and Imaging Institute, University of Utah, Salt Lake City, UT, USA
12/2014	Seminar: "Moment Invariants for Flow Fields by means of Normalization", Institute of Information Theory and Automation, Prague, Czech Republic
03/2014	Seminar: "Moment Invariants for 2D Flow Fields via Normalization", Department of Material Sciences, International Christian University. Tokyo, Japan
03/2012	Seminar: "A General Geometric Fourier Transform", Department of Mathematical Analysis, Ghent University, Belgium
03/2011	Research Seminar: "Clifford Fourier Transforms", Department of Applied Physics, University of Fukui, Japan

TEACHING EXPERIENCE

2015	Participant: "Student, Classroom, Instructor: Strategies for Aligning Teaching with Learning." Center for Educational Effectiveness, UC Davis. Workshop focusing on teaching taxonomy, educational equity, lesson planning, strategies for engaging and assessing students during lecture, promoting student interaction, and incorporation of technology in the classroom.
2014	Teaching Assistant: "Signal Processing", Dr. Mario Hlawitschka. Developed and organized complete series of homework assignments. Taught ancillary concepts not addressed during the lecture. Led discussion and evaluated homework results with students. Assistant auditor for oral examinations.

2009 - 2010	Teaching Assistant: "Mathematics for Teaching", Professor Friedbert Prüfer. Taught ancillary concepts useful for mathematical problems assigned as homework. Led discussion of homework with students. Assistant auditor for oral examinations. Substitute Lecturer for Prof. Prüfer as needed.
2009	Teaching Assistant: "Numerical Mathematics", Professor Peter Kunkel. Led recitation session on applying lecture concepts to practical problems, both by calculation and implementation. Led discussion of homework results with students.
2007 - 2008	Teaching Assistant: "Introductory Mathematics", Dr. Dieter Sosna. Led recitation session to apply the theory from the lectures to solve task-based homework. Evaluation and discussion of results with students.
2006 - 2008	Teaching Assistant: "Java Programming Practical Course", Dr. Monika Meiler. Led recitation session focusing on student modeling and implementation projects (small group projects) including discussion of students' object oriented design approaches and suggestions for possible improvements. Evaluation and grading of student implementations.
2005, 2006	Teaching Assistant: "Introductory C Programming Practical Course", Dr. Monika Meiler. Led recitation session to apply theory from the lecture to practical implementations in the computer lab. Taught group lessons on syntax of the programming language C and assisted students individually.

SYNERGISTIC AND SERVICE ACTIVITIES

08/2014	Workshop Organizer: "Quaternion and Clifford Fourier Transforms and Wavelets 2" at the 10th International Conference on Clifford Algebras and their Applications in Mathematical Physics, University of Tartu, Estonia (ICCA10)
2016 - present	Reviewer: Journal of Mathematical and Computational Applications (MCA)
2016 - present	Reviewer: International Journal of Automation and Computing (IJAC)
2016 - present	Reviewer: Journal of Mathematical Problems in Engineering
2015 - present	Reviewer: Journal of Computing and Information Science in Engineering (JCISE)

2015 - present	Reviewer: IEEE Scientific Visualization (SciVis)
2015 - present	Reviewer: Computer Graphics Forum (CGF)
2015 - present	Reviewer: IEEE Transactions on Visualization and Computer Graphics (TVCG)
2014 - present	Reviewer: 17th EG/VGTC Conference on Visualization (EuroVis 2015)
2014 - present	Reviewer: 8th IEEE Pacific Visualization Symposium (PacificVis 2015)
2014 - present	Reviewer: 10th International Conference on Clifford Algebras and their Applications in Mathematical Physics (ICCA10)
2014 - present	Reviewer: Visualization and Image Processing of Tensor Fields
2014 - present	Reviewer: Applied Mathematics and Computation - Journal (AMC)
2013 - present	Reviewer: Journal on Abstract and Applied Analysis (AAA)
2013 - present	Reviewer: Journal on Clifford Analysis, Clifford Algebras and their Applications (CACAA)
2012 - present	Reviewer: Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE)

REFERENCES

Professor Hans Hagen
Department of Computer Science
Technical University Kaiserslautern
Postfach 3049
67653 Kaiserslautern, Germany
hagen@cs.uni-kl.de

Professor Kenneth I. Joy
Department of Computer Science
University of California, Davis
1 Shields Ave
Davis, CA, 95616, USA
joy@cs.ucdavis.edu

Professor Gerik Scheuermann
Department of Computer Science
Leipzig University
Postfach 100920
04009 Leipzig, Germany
scheuermann@informatik.uni-leipzig.de