

Ingrid Hotz – Publications

Peer-Reviewd

- Englund, R; Ropinski, T.; Hotz, I. *Coherence Maps for Blood Flow Exploration* Eurographics Workshop on Visual Computing for Biology and Medicine, 2016.
- Kasten, J; Reininghaus, J.; Hotz, I; Hege, H-Ch; Noack, B.R; Daviller, G; Morzynski, M. *Acceleration Feature Points of Unsteady Shear Flows* Journal Archives of Mechanics, 2016.
- Jankowai, J; Englund, R; Ropinski, T; Hotz, I. *Interactive 4D MRI blood flow exploration and analysis using line predicates* Proceedings of the EG SIGRAD conference, 2016.
- Flatken, M; Berres, A; Merkel, J; Hotz, I; Gerndt, A; Hagen, H. *Dynamic Schedulig for Progressive Large-Scale Visualization* Proceedings of EG/VGTC Eurovis Short Papers, 2015.
- Bujack, R.; Hotz, I.; Scheuermann, G.; Hitzer, E. *Moment Invariants for 3D Flow Fields Using Normalization*. Proceedings of IEEE Pacific Visualization, 2015.
- Bujack, R.; Hotz, I.; Scheuermann, G.; Hitzer, E. *Moment Invariants for 2D Flow Fields Using Normalization in Detail*. IEEE Transactions on Visualization and Computer Graphics, 21 (8), 619-929, 2015.
- Zobel, V.; Reininghaus, J.; Hotz, I. *Visualizing Symmetric Indefinite 2D Tensor Fields using the Heat Kernel Signature*. Visualization and Processing of Tensors and Higher Order Descriptors for Multi-Valued Data (Dagstuhl'14), Springer-Verlag, 2015.
- Schneich, M.; Kratz, A.; Zobel, V.; Scheuermann, G.; Markus Stommel; Hotz, I. *Tensor lines in Engineering - Success, Failure, and Open Questions*. Visualization and Processing of Tensors and Higher Order Descriptors for Multi-Valued Data (Dagstuhl'14), Springer-Verlag, 2015.
- Schoeneich M.; Stommel M.; Kratz A.; Hotz I.; Burgeth B.; Scheuermann G.; Zobel V. *Optimization strategy for the design of ribbed plastic components*. *Journal of Plastics Technology*, 2014.
- Hotz, I.; Peikert, Definition of a Multifield *Hot Topics in Scientific Visualization*, Springer, 2014.
- Bujack, R.; Hotz, I.; Scheuermann, G.; Hitzer, E. *Moment Invariants for 2D Flow Fields Using Normalization*. *Proceedings of Pacific Vis Conference, 2014, (best paper award)*.
- Kratz, A.; Zobel, M. S. V.; Burgeth, B.; Scheuermann, G.; Hotz, I., Stommel, M. *Tensor Visualization Driven Mechanical Component Design*. *Proceedings of Pacific Vis Conference, 2014*.
- Kratz, A.; Auer, C.; Hotz, I. *Tensor Invariants and Glyph Design*. *Visualization and Processing of Tensors and Higher Order Descriptors for Multi-Valued Data, Springer, 2014*

- Hlawitschka, M.; Hotz, I.; Kratz, A.; Marai, G.; Moreno, R.; Scheuermann, G.; Stommel, M.; Wiebel, A.; Zhang, E. Top Challenges in the Visualization of Engineering Tensor Fields. *Visualization and Processing of Tensors and Higher Order Descriptors for Multi-Valued Data*, Springer, 2014
- Zobel, V.; Reininghaus, J.; Hotz, I. Visualization of Two-Dimensional Symmetric Tensor Fields Using the Heat Kernel Signature. *Topological Methods in Data Analysis and Visualization. Theory, Algorithms, and Applications. (TopoInVis'13)*, Springer, 2014
- Kratz, A.; Baum, D.; Hotz, I. Anisotropic Sampling of Planar and Two-Manifold Domains for Texture Generation and Glyph Distribution. *IEEE Transactions on Visualization and Computer Graphics*, 19, 1782-1794, 2013.
- Auer, C.; Kasten, J.; Kratz, A.; Zhang, E. ; Hotz, I. Automatic, Tensor-Guided Illustrative Vector Field Visualization. *Proceedings of IEEE Pacific Visualization Conference (PacificVis'13)*, 265–275, 2013
- Kratz, A.; Auer, C.; Stommel, M.; Hotz, I. Visualization and Analysis of Second-Order Tensors: Moving Beyond the Symmetric Positive-Definite Case. *Computer Graphics Forum - State of the Art Reports*, 2013
- Günther, D.; Reininghaus, J.; Wagner, H.; Hotz, I. Efficient Computation of 3D Morse-Smale Complexes and Persistent Homology using Discrete Morse Theory. *The Visual Computer*, 28(10), 959–969, 2012
- Kasten, J.; Hotz, I.; Noack, B. R.; Hege, H.-C. Vortex merge graphs in two-dimensional unsteady flow fields. *Proceedings of Eurographics Conference on Visualization (EuroVis'12)*, 2012, (**best short paper award**).
- Auer, C.; Stripf, C.; Kratz, A.; Hotz, I. Glyph- and Texture-Based Visualization of Segmented Tensor Fields. *International Conference on Information Visualization Theory and Applications (IVAPP'12)*. 2012
- Reininghaus, J.; Hotz, I. Computational Discrete Morse Theory for Divergence-Free 2D Vector Fields. *Topological Methods in Data Analysis and Visualization. Theory, Algorithms, and Applications. (TopoInVis'11)*. Springer, 3–14, 2012
- Kasten, J.; Hotz, I.; Hege, H.-Ch. On the Elusive Concept of Lagrangian Coherent Structures. *Topological Methods in Data Analysis and Visualization. Theory, Algorithms, and Applications. (TopoInVis'11)*. Springer, 207–220, 2012
- Hege, H.-C.; Hotz, I.; Kasten, J. Distillation and Visualization of Spatiotemporal Structures in Turbulent Flow Fields. *Journal of Physics: Conference Series*. 2011
- Reininghaus, J.; Kasten, J.; Weinkauff, T. ; Hotz, I. Efficient Computation of Combinatorial Feature Flow Fields. *IEEE Transactions on Visualization and Computer Graphics*, 2011
- Kasten, J.; Reininghaus, J.; Hotz, I. ; Hege, H.-C. Two-dimensional Time-dependent Vortex Regions based on the Acceleration Magnitude. *IEEE Transactions on Visualization and Computer Graphics (VisWeek'11)*, 2011

- Reininghaus, J.; Kotava, N.; Gnther, D.; Kasten, J.; Hagen, H.; Hotz, I. A Scale Space Based Persistence Measure for Critical Points in 2D Scalar Fields. *IEEE Transactions on Visualization and Computer Graphics (VisWeek'11)*, 2011
- Kratz, A.; Meier, B.; Hotz, I. A Visual Approach to Analysis of Stress Tensor Fields. *Scientific Visualization: Interactions, Features, Metaphors, Dagstuhl Follow-Ups (2)*, 188–211, 2011
- Auer, C.; Sreevalsan-Nair, J.; Zobel, V.; Hotz, I. 2D Tensor Field Segmentation. *Scientific Visualization: Interactions, Features, Metaphors, Dagstuhl Follow-Ups (2)*, 17–35, 2011
- Kratz, A.; Kettlitz, N.; Hotz, I. Particle-Based Anisotropic Sampling for Two-Dimensional Tensor Field Visualization. *Proceedings of Vision, Modeling, and Visualization (VMV'11)*, 2011
- Gnther, D.; Reininghaus, J.; Wagner, H.; Hotz, I. Memory-Efficient Computation of Persistent Homology for 3D Images using Discrete Morse Theory. *Proc. Sibgrapi – Conference on Graphics, Patterns and Images*, 2011
- Boyer, E.; Bronstein, A. M.; Bronstein, M. M.; Bustos, B.; Darom, T.; Horaud, R.; Hotz, I.; Kelle, Y.; Keustermans, J.; Kovnatsky, A.; Litman, R.; Reininghaus, J.; Sipiran, I.; Smeets, D.; Suetens, P.; Vandermeulen, D.; Zaharescu, A.; Zobel, V. SHREC 2011: Robust Feature Detection and Description Benchmark. *Proc. Eurographics 2011 Workshop on 3D Object Retrieval (3DOR'11)*, 2011.
- Zobel, V.; Reininghaus, J.; Hotz, I. Generalized Heat Kernel Signature. *Journal of WSCG, International Conference on Computer Graphics, Visualization and Computer Vision*, 2011
- Auer, C.; Hotz, I. Complete Tensor Field Topology on 2D Triangulated Manifolds embedded in 3D. *Computer Graphics Forum (EuroVis'11)*, 30, 831–840, 2011
- Reininghaus, J.; Lowen, C.; Hotz, I. Fast Combinatorial Vector Field Topology. *IEEE Transactions on Visualization and Computer Graphics*, 2010
- Reininghaus, J.; Guenther, D.; Hotz, I.; Prohaska, S; Hege, H-C. TADD: A Computational Framework for Data Analysis using Discrete Morse Theory. *International Congress on Mathematical Software (ICMS '10)*, 2010
- Kasten, J.; Weinkauff, T.; Petz, C.; Hotz, I.; Noack, B. R.; Hege, H.-C. Extraction of Coherent Structures from Natural and Actuated Flows. *Active Flow Control II, Springer, Berlin*, 2010, 108, 373-387
- Kasten, J.; Hotz, I.; Noak, B.; Hege, H.-C. On the Extraction of Long-living Features in Unsteady Fluid Flows. *Topological Methods in Data Analysis and Visualization. Theory, Algorithms, and Applications (TopoInVis'09)*, 2010
- Reininghaus, J.; Hotz, I. Combinatorial 2D Vector Field Topology Extraction and Simplification. *Topological Methods in Data Analysis and Visualization. Theory, Algorithms, and Applications (TopoInVis'09)*, 2010, **(best paper award)**.
- Sreevalsan-Nair, J.; Auer, C.; Hamann, B.; Hotz, I. Eigenvector-based Interpolation and Segmentation of 2D Tensor Fields. *Topological Methods in Data Analysis and Visualization. Theory, Algorithms, and Applications. (TopoInVis'09)*, 2010

- Hotz, I.; Sreevalsan-Nair, J.; Hamann, B. Tensor Field Reconstruction Based on Eigenvector and Eigenvalue Interpolation. Hagen, H. (ed.) *Scientific Visualization: Advanced Concepts Schloss Dagstuhl-Leibniz-Zentrum fuer Informatik*, 2010
- Kasten, J.; Petz, C.; Hotz, I.; Tadmor, G.; Noack, B. R. Hege, H.-C. Lagrangian Feature Extraction of the Cylinder Wake. *Physics of Fluids*, 2010, 22, 091108 - 1
- Kasten, J.; Petz, C.; Hotz, I.; Noack, B.R.; Hege, H.C. Localized Finite-time Lyapunov Exponent for Unsteady Flow Analysis. *Vision, Modeling, and Visualization (VMV'09)*, 2009, pp. 265-274
- Schlemmer, M.; Hotz, I.; Hamann, B.; Hagen, H. Comparative Visualization of Two-Dimensional Flow Data Using Moment Invariants. *Vision, Modeling, and Visualization (VMV'09)*, 2009, pp. 255-264
- Rosanwo, O.; Petz, C.; Hotz, I.; Prohaska, S.; Hege, H.-C. Dual Streamline Seeding. *Proceedings of IEEE Pacific Visualization Symposium 2009*
- Feng, L.; Hotz, I.; Hamann, B. Joy, K. I. Dense Glyph Sampling for Visualization. *Visualization and Processing of Tensor Fields: Advances and Perspectives*, Springer-Verlag, 2008, 177-193
- Feng, L.; Hotz, I.; Hamann, B.; Joy, K.I. Anisotropic Noise Samples for Tensor Field Visualization. *IEEE Transactions on Visualization and Computer Graphics* 2008, Vol. 14, pp. 342-354
- Schlemmer, M.; Heringer, M.; Morr, F.; Hotz, I.; Hering-Bertram, M.; Garth, C.; Kollmann, W.; Hamann, B.; Hagen, H. Moment Invariants for the Analysis of 2D Flow Fields. *IEEE Trans. Vis. Comput. Graph.*; 2007, Vol. 13(6), pp. 1743-1750
- Schlemmer, M.; Hotz, I.; Hamann, B.; Morr, F.; Hagen, H. Priority Streamlines: A context-based Visualization of Flow Fields. *EG/IEEE VGTC Symposium on Visualization (EuroVis '07)*, 2007, pp. 227-234
- Sreevalsan-Nair, J.; Verhoeven, M.; Woodruff, D.L.; Hotz, I.; Hamann, B. Human-guided enhancement of a stochastic local search: Visualization and adjustment of 3D pheromone. Stuetzle, T.; Birattari, M.; Hoos, H. (ed.) *Proceedings of Engineering Stochastic Local Search Algorithms (SLS) 2007* 2007, Vol. 4638, pp. 182-186
- Sreevalsan-Nair, J.; Nieuwenhuysse, E. V.; Hotz, I.; Linsen, L. Hamann, B. An Interactive Visual Exploration Tool for Northern California's Water Monitoring Networks. *Conference on Visualization and Data Analysis (VDA 2007)*, 2007, 1-12
- Park, S.; Yu, H.; Hotz, I.; Linsen, L. Hamann, B. Structure-accentuating Dense Flow Visualization. *Eurographics/IEEE VGTC Symposium on Visualization (EuroVis '06)*, 2006, 163-170
- Hotz, I.; Feng, L.; Hamann, B.; Joy, K. Tensor-fields Visualization using a Fabric like Texture on Arbitrary two-dimensional Surfaces. Mller, T.; Hamann, B.; Russell, R. (ed.) *Mathematical Foundations of Scientific Visualization, Computer Graphics Springer* , 2006
- Schlemmer, M.; Hagen, H.; Hotz, I. Hamann, B. Clifford Pattern Matching for Color Image Edge Detection. Hagen, H.; Kerren, A. Dannenmann, P. (ed.) *Visualization of Large and Unstructured Data Sets, GI-Edition*, 2006, S-4

- Schlemmer, M.; Hotz, I.; Natarajan, V.; Hamann, B.; Hagen, H. Fast Clifford Fourier transformation for unstructured vector field data. *Proc. Intl. Conf. Numerical Grid Generation in Computational Field Simulations 2005*, pp. 101-110
- Hotz, I.; Feng, L.; Hagen, H.; Hamann, B.; Joy, K. Tensor Field Visualization Using a Metric Interpretation. Weickart, J.; Hagen, H. (ed.) *Visualization and Image Processing of Tensor Fields, Chapter 16 Springer, 2005*, pp. 269-280
- Hotz, I.; Hagen, H. Isometric Embedding for a Discrete Metric. Brunnett, G.; Hamann, B.; Mller, H.; Linsen, L. (ed.) *Geometric Modeling for Scientific Visualization Springer, 2004*, pp. 19-36
- Hagen, H.; Hotz, I. Variational modeling methods for Visualization. Johnson, C.R.; Hansen, C.D. (ed.) *Visualization Handbook. Chapter 19 Springer, 2004*, pp. 381-392
- Hotz, I.; Feng, L.; Hagen, H.; Hamann, B.; Jeremic, B.; Joy, K. Physically Based Methods for Tensor Field Visualization. *Proceedings of the 14th IEEE Visualization Conference 2004*, pp. 123-130
- Hotz, I. Isometric embedding by surface reconstruction from distances. *VIS '02: Proceedings of the conference on Visualization '02 IEEE Computer Society, 2002*, pp. 251-258
- Hotz, I.; Hagen, H. Visualizing geodesics. *VIS '00: Proceedings of the conference on Visualization '00 IEEE Computer Society Press, 2000*, pp. 311-318
- Ingrid Hotz. *Qualitätsanalyse-Algorithmen, (Quality analysis algorithms)*. In: Hans Hagen, Guido Brunnett, Heinrich Müller and Dieter Roller, editors, *Effiziente Methoden der geometrischen Modellierung und der wissenschaftlichen Visualisierung*, pages 55-85. Teubner, 1997
- Ingrid Hotz. *Wigner Eckart Theorem für Quantengruppen und die Darstellung der Quantenlorenzgruppe, (Wigner Eckart Theorem for Quantum Groups and the Representation of the Quantum Lorentz Group)*. Diploma thesis, April 1996.

Editorial activities

- *Visualization and Processing of Tensors and Higher Order Descriptors for Multi-Valued Data (Dagstuhl'14), (Mathematics and Visualization)*. Editors: Ingrid Hotz, Thomas Schultz, Springer, to appear.
- *Topological Methods in Data Analysis and Visualization III: Theory, Algorithms, and Applications (Mathematics and Visualization)*. Editors: Peer-Timo Bremer, Ingrid Hotz, Valerio Pascucci, Ronald Peikert, Springer, 2014.
- *Computer Graphics Forum, Volume 28 - Issue 3 (EuroVis 09)*, Guest Editors: Hans-Christian Hege, Ingrid Hotz, Tamara Munzner, 2009.

Tutorials

- Hotz, I.; Vilanova, A.; Schultz, T.; Zhang, E. *Tutorial: Introduction to Tensor Field Visualization: Concepts, Processing and Visualization*, IEEE Visualization Conference, 2014.

Other publications including posters and tech-reports

- Hotz, I.; Özarslan, E.; Schultz, T. *Multidisciplinary Approaches to Multivalued Data: Modeling, Visualization, Analysis - (Dagstuhl Seminar 16142)* Dagstuhl Reports, (6)4, pp 16–38 2016.
- Engelke, W.; Kuhn, A.; Flatken, M.; Chen, F.; Hege, H.-C.; Gerndt, A.; Hotz, I. *Atmospheric Impact of Volcano Eruptions*. Contribution to IEEE Visualization Conference, SciVis Contest, 2014.
- Bujack, R.; Hotz, I.; Kasten, J.; Scheuermann, G.; Hitzler, E. *Moment Invariants for 3D Flow Fields*. Poster presentation at the IEEE Visualization Conference, 2014, (**SCIVIS Honorable Mention Award**)
- Kasten, J.; Reininghaus, J.; Hotz, I.; Hege, H.-C.; Noack, B.; Daviller, G.; Morzynski, M. *Acceleration feature points of unsteady shear flows*. Arxiv, arXiv:1401.2462, 2014.
- Burgeth, B.; Hotz, I.; Vilanova, A.; Westin, C-F. *Visualization and Processing of Higher Order Descriptors for Multi-Valued Data (Dagstuhl Seminar 14082)* Dagstuhl Reports, (6)4, pp 16–38 2014.
- Chen, F.; Flatken, M.; Hotz, I.; Gerndt, A. *In-situ processing and interactive visualization for large-scaled CFD simulations*. Poster presentation at the LDAV Symposium, 2014.
- Reininghaus, J.; Gnther, D.; Hotz, I.; Weinkauff, T.; Seidel, H. P. *Combinatorial Gradient Fields for 2D Images with Empirically Convergent Separatrices*. arXiv:1208.6523v1, 2012.
- Kratz, A.; Hadwiger, M.; Hotz, I. *Improved Visual Exploration and Hybrid Rendering of Stress Tensor Fields via Shape-Space Clustering*. Poster presentation, IEEE VisWeek'11, Providence, 2011.
- Kratz, A.; Reininghaus, J.; Hadwiger, M.; Hotz, I. *Adaptive Screen-Space Sampling for Volume Ray-Casting*. TechReport Zuse Institut Berlin, 2011.
- Hotz, I.; Feng, L.; Hamann, B.; Manaker, D.; Conjeepuram, N.; Kellogg, L.H. *Exploring Tensor Fields Using a Fabric Like Texture on Arbitrary Surfaces*. Poster Presentation at the American Geophysical Union (AGU) fall meeting, 2005
- Hotz, I.; Feng, L.; Hamann, B.; Joy, K.I.; Manaker, D.M.; Kellogg, M.I.B.L.H. *Tensor Field Visualization in Geomechanics Applications*. Poster Presentation at the American Geophysical Union Meeting 2004

1 Ingrid Hotz – Talks

- Dense Glyph Sampling for Visualization, Invited conference talk, Scientific Visualization, Schloss Dagstuhl, International Conference and Research Center for Computer Science, Germany, July 15-20, 2007.
- Anisotropic Noise Samples for Tensor Field Visualization, Invited conference talk, Visualization and Processing of Tensor Fields, Schloss Dagstuhl, International Conference and Research Center for Computer Science, Germany, January 07-13, 2007.
- Visualization for Complex Systems, Talk at the Seminar Series Complex Systems, Dept. Computational Science and Engineering, University of California Davis, January 15, 2006.
- Exploring Tensor Fields Using a Fabric Like Texture on Arbitrary Surfaces, Ingrid Hotz, Louis Feng, Bernd Hamann, David Manaker, Natarajan Conjeevaram, Louise H. Kellogg, Poster Presentation at the American Geophysical Union (AGU) fall meeting, December 2005.
- Slicing 3-dimensional Volumes for Tensor Field Exploration, Invited conference talk, Workshop on Scientific Visualization: Challenges for the Future, Schloss Dagstuhl, International Conference and Research Center for Computer Science, Germany, June, 05-10, 2005.
- Tensor Field Visualization in Geomechanics Applications, Ingrid Hotz, Louis Feng, Bernd Hamann, David Manaker, Louise H. Kellogg, Poster Presentation at the American Geophysical Union (AGU) fall meeting, December 2004
- Physically Based Methods for Tensor Field Visualization, Conference talk, IEEE Visualization Conference 2004, Austin, Texas, USA, Oct. 8-13, 2004.
- Geometrische Algorithmen zur Visualisierung diskreter und kontinuierlicher Tensorfelder, Colloquium talk, Best-Dissertation'03-Award-Colloquium, German Society of Computer Science (GI), Academy Mainz, Germany, June 3-4, 2004.
- Geometric Interpretation of Tensor Fields for Visualization, Invited conference talk, Mathematical Foundations of Scientific Visualization, Computer Graphics, and Massive Data Exploration, Banff International Research Station, Canada, May 22-27, 2004.
- Tensor Field Visualization Using a Metric Interpretation, Invited conference talk, Perspectives Workshop: Visualization and Image Processing of Tensor Fields, Schloss Dagstuhl, International Conference and Research Center for Computer Science, Germany, April 18-23, 2004
- Isometric Embedding by Surface Reconstruction from Distances, Conference talk, IEEE Visualization Conference 2002, Boston, MA, USA, Oct. 27 - Nov. 1, 2002.
- Visualizing Second Order Symmetric Tensor-Fields as Metrical Surfaces, Conference talk, Work in progress, IEEE Visualization Conference 2001, San Diego, CA, USA, Oct. 21-26, 2001.

- Visualizing Geodesics, Conference talk, IEEE Visualization Conference 2000, Salt Lake City, Utah, USA, Oct. 8-13, 2000.
- Visualisierung von Skalarfeldern, German Society of Computer Science (GI) talk, GI-Forschungsseminar: “Effiziente Methoden der geometrischen Modellierung und der wissenschaftlichen Visualisierung”, Schloss Dagstuhl, International Conference and Research Center for Computer Science, Germany, May 05-09, 1997.