Prof. Chris Wojtan, Ph.D.

CONTACT INFORMATION

Institute of Science and Technology Austria
Am Campus 1
3400 Klosterneuburg, Austria

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WWW: http://pub.ist.ac.at/group_wojtan/

RESEARCH INTERESTS

Physics based animation
Dynamics of fluids, solids, and more exotic materials.

Numerical Algorithms
Numerical integration, conservation schemes, efficient data structures, finite element methods, computational fluid dynamics.

Geometry Processing
Mesh generation, deformation, discretization, topology changes.

Animation control
Optimization, animation with constraints.

EDUCATION

Georgia Institute of Technology, Atlanta, Georgia USA

Ph.D., Computer Science, December 17, 2010

- Dissertation Title: "Animating Physical Phenomena with Embedded Surface Meshes"
- Advisor: Greg Turk

University of Illinois, Urbana, Illinois USA

B.S., Computer Science, Minors in Math and Physics, May 2004

- Advisors: Michael Garland and Yizhou Yu

HONORS AND AWARDS

ACM SIGGRAPH Significant New Researcher Award 2016
Eurographics Young Researcher Award 2015
Günter Enderle Best Paper Award, Eurographics 2015
European Research Council (ERC) Starting Grant 2015
Microsoft Visual Computing Award, from Austria Association for Pattern Recognition 2013
IST Austria "Golden Chalk" Best lecturer award 2013
Best Doctoral Dissertation Award from Georgia Tech chapter of Sigma Xi 2011
Outstanding Graduate Research Assistant Award, Georgia Tech College of Computing 2010
National Science Foundation Graduate Research Fellowship 2005 – 2008
Presidential Fellowship at Georgia Institute of Technology 2004
James Scholarship at University of Illinois 2000 – 2004
Dean's List at University of Illinois College of Engineering 2000 – 2004

EMPLOYMENT

Institute of Science and Technology Austria, *Professor*	Jan 2016 – present
Institute of Science and Technology Austria, *Assistant Professor*	Feb 2011 – Dec 2015
Georgia Institute of Technology, *Research Assistant*	Aug 2004 – Dec 2010
ETH Zürich, *Visiting Researcher*	Summer 2008, Winter 2009
Carnegie Mellon University, *Visiting Researcher*	Fall 2006
Lawrence Livermore National Laboratory, *Summer Scholar*	Summer 2004
University of Illinois, Urbana-Champaign, *Course Grader*	Fall 2003

JOURNAL PUBLICATIONS

"Adaptive Physically Based Models in Computer Graphics," Pierre-Luc Manteaux, **Chris Wojtan**, Rahul Narain, Stéphane Redon, François Faure, Marie-Paule Cani. *Computer Graphics Forum (Eurographics 2016 State-of-the-Art Report).*

"Generalized Non-reflecting Boundaries for Liquid Simulation," Morten Bojsen-Hansen and **Chris Wojtan**. *ACM Transactions on Graphics (SIGGRAPH 2016).* 25% Acceptance.

"Fast approximations for boundary element based brittle fracture simulation," David Hahn and **Chris Wojtan**. *ACM Transactions on Graphics (SIGGRAPH 2016).* 25% Acceptance.

"Surface-Only Liquids," Fang Da, David Hahn, Christopher Batty, **Chris Wojtan**, and Eitan Grinspun. *ACM Transactions on Graphics (SIGGRAPH 2016)*. 25% Acceptance.

"A Practical Method for High-Resolution Embedded Liquid Surfaces," Ryan Goldade, Christopher Batty, and **Chris Wojtan**. *Computer Graphics Forum (Eurographics 2016)*.

"Narrow Band FLIP for Liquid Simulations," Florian Ferstl, Ryoichi Ando, **Chris Wojtan**, Rudiger Westermann, and Nils Thuerey. *Computer Graphics Forum (Eurographics 2016)*.

"High-Resolution Brittle Fracture Simulation with Boundary Elements," David Hahn and **Chris Wojtan**. *ACM Transactions on Graphics (SIGGRAPH 2015)* Vol 34, No. 4. 25% Acceptance.

"A Stream Function Solver for Liquid Simulations," Ryoichi Ando, Nils Thuerey, and **Chris Wojtan**. *ACM Transactions on Graphics (SIGGRAPH 2015)* Vol 34, No. 4. 25% Acceptance.

"Double Bubbles Sans Toil and Trouble: Discrete Circulation-Preserving Vortex Sheets for Soap Films and Foams," Fang Da, Christopher Batty, **Chris Wojtan**, and Eitan Grinspun. *ACM Transactions on Graphics (SIGGRAPH 2015)* Vol 34, No. 4. 25% Acceptance.

"Water Wave Animation via Wavefront Parameter Interpolation," Stefan Jeschke and **Chris Wojtan**. *ACM Transactions on Graphics (presented at SIGGRAPH 2015)* Vol 34, No. 3.

"A Dimension-reduced Pressure Solver for Liquid Simulations," Ryoichi Ando, Nils Thuerey, and **Chris Wojtan**. *Computer Graphics Forum (Eurographics 2015)*. 27% Acceptance.
Best Paper Award

"Blending Liquids," Karthik Raveendran, **Chris Wojtan**, Nils Thuerey, and Greg Turk. *ACM Transactions on Graphics (SIGGRAPH 2014)* Vol 33, No. 4, Article 137. 25% Acceptance.

"Liquid Surface Tracking with Error Compensation," Morten Bojsen-Hansen and **Chris Wojtan**. *ACM Transactions on Graphics (SIGGRAPH 2013)* Vol. 32, No. 4, Article 68, 2013. 24% Acceptance.

"Putting holes in holey geometry: topology change for arbitrary surfaces," Gilbert Louis Bernstein and **Chris Wojtan**. *ACM Transactions on Graphics (SIGGRAPH 2013)* Vol. 32, No. 4, Article 34, 2013. 24% Acceptance.

"Highly adaptive liquid simulations on tetrahedral meshes," Ryoichi Ando, Nils Thuerey and **Chris Wojtan**. *ACM Transactions on Graphics (SIGGRAPH 2013)* Vol. 32, No. 4, Article 103, 2013. 24% Acceptance.

"Tracking Surfaces with Evolving Topology," Morten Bojsen-Hansen, Hao Li, and **Chris Wojtan**. *ACM Transactions on Graphics (SIGGRAPH 2012)* Vol. 31, No. 4, Article 53, 2012. 21% Acceptance.

"Explicit Mesh Surfaces for Particle Based Fluids," Jihun Yu, **Chris Wojtan**, Greg Turk, and Chee Yap. *Computer Graphics Forum (Proceedings of Eurographics 2012)* Vol. 31, No. 2, pp. 815-824, 2012. 25% Acceptance.

"Physics-Inspired Topology Changes for Thin Fluid Features," **Chris Wojtan**, Nils Thuerey, Markus Gross, and Greg Turk. *ACM Transactions on Graphics (SIGGRAPH 2010)* Vol. 29, No. 4, Article, 2010. 26% Acceptance.

"A Multiscale Approach to Mesh-based Surface Tension Flows," Nils Thuerey, **Chris Wojtan**, Markus Gross, and Greg Turk. *ACM Transactions on Graphics (SIGGRAPH 2010)* Vol. 29, No. 4, Article, 2010. 26% Acceptance.

"Fluid Simulation with Articulated Bodies." Nipun Kwatra, **Chris Wojtan**, Mark Carlson, Irfan A. Essa, Peter J. Mucha, Greg Turk. *IEEE Transactions on Visualization and Computer Graphics*, Vol. 16, No. 1, pp. 70-80, Jan./Feb. 2010, doi:10.1109/TVCG.2009.66

"Deforming Meshes that Split and Merge." **Chris Wojtan**, Nils Thuerey, Markus Gross, and Greg Turk. *ACM Transactions on Graphics (SIGGRAPH 2009)* Vol. 28, No. 3, Article, 2009. 18% Acceptance.

"Fast Viscoelastic Behavior with Thin Features." **Chris Wojtan** and Greg Turk. *ACM Transactions on Graphics (SIGGRAPH 2008)* Vol. 27, No. 3, Article, 2008. 17% Acceptance.

"A Finite Element Method for Animating Large Viscoplastic Flow." Adam W. Bargteil, **Chris Wojtan**, Jessica K. Hodgins, and Greg Turk. *ACM Transactions on Graphics (SIGGRAPH 2007)* Vol. 26, No. 3, 2007. 24% Acceptance.

"Controllable Motion Synthesis in a Gaseous Medium." Lin Shi, Yizhou Yu, **Chris Wojtan**, and Stephen Cheney. *The Visual Computer* Vol. 21, No. 7, 2005, pp.474-487.

Peer-Reviewed Conference Publications

"Space-time Sculpting of Liquid Animation," Pierre-Luc Manteaux, Ulysse Vimont, **Chris Wojtan**, Damien Rohmer, Marie-Paule Cani. in Proceedings of *Motion In Games*, San Francisco, California, USA, 2016.

"Controlling Liquids Using Meshes," Karthik Raveendran, Nils Thürey, **Chris Wojtan**, and Greg Turk. in Proceedings of *ACM SIGGRAPH/Eurographics Symposium on Computer Animation*, Lausanne, Switzerland, 2012. 34% Acceptance.

"Hybrid Smoothed Particle Hydrodynamics," Karthik Raveendran, **Chris Wojtan**, and Greg Turk. in Proceedings of *ACM SIGGRAPH/Eurographics Symposium on Computer Animation*, pp. 33–42, Vancouver, Canada, 2011. 39% Acceptance.

"Animating Corrosion and Erosion." **Chris Wojtan**, Mark Carlson, Peter J. Mucha, and Greg Turk. in Proceedings of *Eurographics Workshop on Natural Phenomena*, pp. 21–29, Prague, Czech Republic, September 4, 2007.

"Control of Complex Particle Systems Using the Adjoint Method." **Chris Wojtan**, Peter J. Mucha, and Greg Turk. in Proceedings of *ACM SIGGRAPH/Eurographics Symposium on Computer Animation*, pp. 15–23, Vienna, Austria, 2006. 29% Acceptance.

Peer-Reviewed Courses

"Liquid Simulation with Mesh-Based Surface Tracking," **Chris Wojtan**, Matthias Müller-Fischer, and Tyson Brochu. *ACM SIGGRAPH 2011 Courses*, Vancouver, Canada, 2011.

Invited Talks

"Algorithms for Accelerating Large-Scale Liquid Simulations", University of Tokyo, Tokyo, Japan, October 18, 2016.

"Computing Fracture Surface Patterns", Geometry and Materials Sciences workshop (GEMS 2016), Okinawa, Japan, October 15, 2016.

"Surface-Only Methods for Simulating Flow and Fracture", Pacific Graphics Keynote talk, Okinawa, Japan, October 13, 2016.

"Flow and Fracture: Recent research from the Wojtan group at IST Austria", Disney Animation Studios, Burbank, California, USA, July 29, 2016.

"Probing Nature with Computer Graphics", ACM SIGGRAPH Conference on Computer Graphics and Interactive Techniques, ACM SIGGRAPH Significant New Researcher Award talk. Anaheim, California, USA, July 25, 2016.

"Flow and Fracture: Recent research from the Wojtan group at IST Austria", Dreamworks Animation, Glendale, California, USA, July 22, 2016.

"How to make a Big Splash: Efficient Simulation of Natural Phenomena at Large Scales", HiVisComp, Behemian Forest, Czech Republic, February 5, 2016.

"How to make a Big Splash: Efficient Simulation of Natural Phenomena at Large Scales", Institute-wide Fourth Year Colloquium Lecture, IST Austria, Klosterneuburg, Austria, September 30, 2016.

"How to make a Big Splash: Efficient Simulation of Natural Phenomena at Large Scales", Disney Animation Studios, Burbank, California, USA, August 14, 2015.

"A Stream Function Solver for Liquid Simulations." Geometry Workshop in Seggau 2015. Seggau, Austria. July 10-12, 2015.

"How to make a Big Splash: Efficient Simulation of Natural Phenomena at Large Scales", Pixar Studios, Emeryville, California, USA, April 8, 2015.

"A General Framework for Bilateral and Mean Shift Filtering", Google Headquarters, Mountainview, California, April 7, 2015.

"How to make a Big Splash: Efficient Simulation of Natural Phenomena at Large Scales", Industrial Light & Magic, San Francisco, California, USA, April 6, 2015.

"How to make a Big Splash: Efficient Simulation of Natural Phenomena at Large Scales", University of California, Berkeley, April 3, 2015.

"How to make a Big Splash: Efficient Simulation of Natural Phenomena at Large Scales", Stanford University, April 2, 2015.

"Math, Science, and Computer Simulations", Lockport Township High School, Illinois, USA, March 31, 2015.

"How to make a Big Splash: Efficient Simulation of Natural Phenomena at Large Scales", University of Illinois in Urbana Champaign, March 30, 2015.

"Compensating for Defects in Geometric Models and Liquid Surfaces." Technical University of Denmark, Lyngby, Denmark. December 10, 2014.

"Big Splash: Efficient Simulation of Natural Phenomena at Extremely Large Scales", ERC interview in Brussels, Belgium, Sept 29 2014.

"Compensating for Defects in Geometric Models and Liquid Surfaces." INRIA, Grenoble, France. February 20, 2014.

"Putting Holes in Holey Geometry." Geometry Workshop in Strobl 2013. Strobl, Austria. August 28-September 1, 2013.

"Surface Tracking for Physical Simulation and Computer Graphics." Summer school on Discrete and Computational Geometry. Demino, Yaroslavl, Russia. July 22-August 2, 2013.

"Deforming Meshes with Topological Changes." ÖAGM / AAPR 2013 - The 37th Annual Workshop of the Austrian Association for Pattern Recognition. Microsoft Visual Computing Award talk. Innsbruck, Austria. May 23-24, 2013.

"Deforming Meshes with Topological Changes." The MIT Symposium on Computer Graphics. Massachusetts Institute of Technology, Cambridge, Massachusetts, USA. March 25, 2013.

"Deforming Meshes that Split and Merge." VisionDay 2012. Technical University of Denmark, Lyngby, Denmark. May 30, 2012.

"Deforming Meshes that Split and Merge." Spring Conference on Computer Graphics. Smolenice castle, Slovakia. May 4, 2012.

"Deformable Surfaces with Topology Changes for Physics-Based Animation." Technical University of Vienna. Vienna, Austria. October 21, 2011.

"Fast and Detailed Surface Tension Simulation." Geometry Workshop in Obergurgl 2011. Obergurgl, Austria. June 12–23, 2011.

"Deformable Surfaces with Topology Changes for Physics-Based Animation." Central European Seminar on Computer Graphics (CESG 2011). Bratislava, Slovakia. May 2–4, 2011.

"Physics-Inspired Topology Changes for Thin Fluid Features." California Institute of Technology, Pasadena, California. July 30, 2010.

"Deformable Surfaces for Physics-Based Animation." ETH Zürich, Switzerland. July 19, 2010.

"Deformable Surfaces for Physics-Based Animation." Institute of Science and Technology Austria. Klosterneuburg, Austria. April 14, 2010.

"Deformable Surfaces for Physics-Based Animation." University of Utah. Salt Lake City, Utah. April 21, 2010.

"Lagrangian Surfaces for Fluid Animation." 2010 Bellairs Workshop on Computer Animation. Barbados. Bellairs Research Institute, St. James, Barbados. February 22-26, 2010.

"Mesh-based Surface Tracking with Topology Changes." Institute of Science and Technology Austria. Klosterneuburg, Austria. November 13, 2009.

"Meshy Fluids!" Carnegie Mellon University computer graphics research retreat, Pittsburgh, Pennsylvania, USA. October 17, 2009.

"Viscoelastic Finite Elements for Computer Animation." ETH. Zürich, Switzerland. May 21, 2008.

"Viscoelastic Finite Elements for Computer Animation." INRIA. Nancy, France. March 1, 2008.

"Finite Element Goop with Embedded Surface Meshes." Carnegie Mellon University computer graphics research retreat, Pittsburgh, Pennsylvania, USA. July 11, 2007.

"Control of Complex Particle Systems Using the Adjoint Method." University of Illinois. Urbana, Illinois, USA. November 15, 2006.

"Control of Complex Particle Systems Using the Adjoint Method." Carnegie Mellon University. Pittsburgh, Pennsylvania, USA. Fall 2006.

Press

"Wie ein Tropfen ins Wasser fllt", *Die Presse*. 23 September 2016. `http://diepresse.com/home/science/dissertation/5090579/Wie-ein-Tropfen-ins-Wasser-faellt`

"Wie simuliert man die perfekte Welle?", *Die Presse*. 28 August 2014. `http://diepresse.com/home/science/forschungsfrage/4808893/Wie-simuliert-man-die-perfekte-Welle`

"Die Welt im Computer verdoppeln", *Der Standard*. 10 October 2014. `http://derstandard.at/2000006539847/Die-Welt-im-Computer-verdoppeln`

"Mehrdimensionales: Grafik und Interaktion auf der Siggraph 2012 in Los Angeles", German computer magazine *c't* 19/2012. `http://heise.de/-1673533`

"Computer lernt mit komplexen Bildfolgen umzugehen", *Der Standard*. 1 August 2012. `http://derstandard.at/1343743525465/Computer-lernt-mit-komplexen-Bildfolgen-umzugehen`

Funding

"Big Splash: Efficient Simulation of Natural Phenomena at Extremely Large Scales", €1,500,000. European Research Council (ERC) Starting Grant 638176 , 2015-2020.

"Embedded Meshes for Flow and Fracture" (Listed as senior personnel), $466,478. National Science Foundation Award 1017014, 2010-2013.

Teaching

Courses Taught:

Numerical Algorithms	IST Austria. February–April 2017 (half module)
Modeling	IST Austria. Fall 2015 (core course), with Nick Barton
Modeling	IST Austria. Spring 2015 (core course), with Caroline Uhler
Differential Equations	IST Austria. May–July 2014 (half module)
Image Processing	IST Austria. Feb–May 2014 (half module), with Christoph Lampert
Differential Equations	IST Austria. March–May 2012 (half module)
Differential Equations	IST Austria. May–July 2013 (half module)

Teaching Assitantships:

CS4451 (Georgia Tech)	Computer Graphics. Spring 2006.
CS3510 (Georgia Tech)	Design and Analysis of Algorithms. Fall 2004.
CS257 (UIUC)	Numerical Methods. Fall 2003.

Mentorship

Post-Doctoral Researchers

Stefan Jeschke (IST Austria, May 2012–2016)
Ryoichi Ando (IST Austria, 2014–2016)
Ewa Gajda-Zagorska (IST Austria, 2015–present)
Camille Schreck (IST Austria, November 2016–present)

Ph.D. Students

Karthik Raveendran (co-advised at Georgia Tech with Greg Turk, 2009–2014)
Morten Bojsen-Hansen (IST Austria, 2011–2016)
Jakob Egger (IST Austria, 2011–2013)
David Hahn (IST Austria, 2013–present)

Rotation Students at IST Austria

Jakob Egger (fall 2011)
Maurizio Morri (spring 2012)
David Hahn (fall 2012)
Bo Wu (spring 2013)
Ruslan Guseinov (fall 2014)
Ran Zhang (spring 2015)
Rok Grah (fall 2015)
Peter Synak (fall 2015)
Nishchal Agrawal (spring 2016)
Davide Scarselli (spring 2016)
Amelie Royer (spring 2016)
Sergey Avvakumov (spring 2016)
Tomas Skrivan (fall 2016)

Unaffiliated students

Official mentor of unaffiliated IST Austria Ph.D. students during the following years:

- Academic year 2012–2013
- Academic year 2013–2014
- Academic year 2016–2017

Research Interns

Bhavna Mahadevan (co-advised with Greg Turk) from Georgia Tech, Summer 2010
Sahil Singla from IIT Delhi, Summer 2012
Shashwat Garg from IIT Delhi, Summer 2012
Ryoichi Ando from Kyushu University, Japan, 2012–2014
Ryan Goldade from SFU, 2014
Alvaro Fernandez Sanchez from Universidad Rey Juan Carlos, Madrid, Spain, 2014–2015
Selver Pepic from University of Sarajevo, Bosnia, 2015
Julia Lyudchik from Belarusian State University, Belarus, 2016
Hikaru Ibayashi from University of Tokyo, Japan, 2016

Qualifying Exam Committees

Arjun Radhakrishna. IST Austria. March 15, 2011. (Exam chair)
Viktoriia Sharmanska. IST Austria. September 6, 2011.
Morten Bojsen-Hansen. IST Austria. September 6, 2012.
Jakob Egger. IST Austria. March 15, 2012.
David Hahn. IST Austria. August 19, 2013.
Damaris Ketino Rangel Guerrero. IST Austria. November 28, 2014. (Exam chair)
Chaitanya Paranjape. IST Austria. January 28, 2015.
Ran Zhang. IST Austria. January 28, 2016.
Ruslan Guseinov. IST Austria. January 29, 2016.
Karla Hulyev. IST Austria. February 15, 2016. (Exam chair)

Ph.D. Thesis Proposal Committees
Thesis proposal of Karthik Raveendran. Georgia Tech. August 21, 2013.

Ph.D. Thesis Defense Committees
Juraj Onderik. Comenius University, Bratislava. September 30, 2011.
Jihun Yu. New York University. September 7, 2011.
Karthik Raveendran. Georgia Tech. July 29, 2014.
Asger Nyman Christiansen. Denmark Technical University. December 11, 2014.
Viktoriia Sharmanska. IST Austria. February 13, 2015.
Fang Da. Columbia University. June 9, 2016.
Murat Tugrul. IST Austria. June 27, 2016. (Exam chair)
Morten Bojsen-Hansen. IST Austria. July 15, 2016. (Ph.D. Advisor)

Community Service

Technical Papers Chair
Symposium on Computer Animation (SCA) 2016

Papers Committee
SIGGRAPH 2012, 2013, 2015, 2016
SIGGRAPH Asia 2011
Eurographics 2015
Symposium on Computer Animation (SCA) 2011, 2012, 2013, 2014, 2015
Symposium on Geometry Processing (SGP) 2012, 2013, 2014, 2016
Shape Modeling International (SMI) 2013, 2016

Reviewer
SIGGRAPH 2005, 2007–present
SIGGRAPH Asia 2008–present
SIGGRAPH Courses 2007
Eurographics 2006, 2007, 2009–present
Symposium on Computer Animation (SCA) 2007, 2011–present
Symposium on Geometry Processing (SGP) 2011–2014
Eurographics Workshop on Natural Phenomena 2007
Computer Graphics Forum
Computers and Graphics
Graphical Models
Graphics Interface 2011
IEEE Transactions on Pattern Analysis & Machine Intelligence (PAMI)
IEEE Computer Graphics and Applications (CGA)
IEEE Transactions on Visualization and Computer Graphics (TVCG)
ACM Transaction on Graphics

Other Service
- IST Austria visiting scientists committee 2016, 2017
- IST Austria internal events committee 2015, 2016, 2017 (chair)
- IST Austria interdisciplinary projects committee 2014, 2015, 2016
- IST Austria open campus day 2013
- IST Austria annual retreat planning committee 2011, 2012
- Give lectures on physics-based special effects to high school students in Lockport Township High

School, Lockport, IL, USA. (2005, 2008, 2015)
- Georgia Tech PhD student recruiting activities, 2005–2010