CURRICULUM VITAE

JACK GOLDFEATHER

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EDUCATION

Ph.D. (Mathematics) Purdue University, 1975
Thesis Title: Fibre Maps and Incompressibility
Thesis Advisor: Stephen Weingram
M.S. (Mathematics) Purdue University, 1971
B.A. (Mathematics) Rutgers University, 1969

TEACHING EXPERIENCE

William H. Laird Professor of Mathematics, Computer Science and the Liberal Arts, Emeritus , Carleton College, 2015-present.

William H. Laird Professor of Mathematics, Computer Science and the Liberal Arts, Carleton College, 2009-2015.

Chair of the Department of Mathematics and Computer Science, Carleton College, 1989 - 1992.

Professor of Mathematics and Computer Science, 1989 - 2009.

Associate Professor of Mathematics and Computer Science, 1986-1989.

Associate Professor of Mathematics, Carleton College, 1984-1986.

Assistant Professor of Mathematics, Carleton College, 1977-1984.

Lecturer in Mathematics, University of Wisconsin-Milwaukee, 1975-1977.

Teaching Assistant, Purdue University, 1969-1975.

CONSULTING WORK

Consultant for Boston Scientific, 2016-2017.

Consultant for Victoria Interrante and others on projects relating to curvature calculations on surface meshes, University of Minnesota, 2000-2012.

Consultant for various head-tracking projects related to augmented reality, University of North Carolina, 1992-1993.

Consultant for Pixel-Planes research group, University of North Carolina at Chapel Hill: Graphics algorithms for parallel machines; algorithm analysis; network analysis; VLSI enhancement for Pixel-planes5 1984-1992.

RESEARCH INTERESTS

Computer Graphics: Virtual Reality, Visualization of turbulent fluid flow, Mathematics relating to surface meshes, Algorithms for rapid image display, Special purpose VLSI graphics hardware, tracking and calibration in head-mounted virtual reality systems.

Algebraic Topology: Homotopy Theory, Incompressible Maps

SELECTED TALKS AND ADDRESSES

Invited William H. Laird Lecture at Carleton College, 2011. Title: *The Mathematician's Canvas — My Journey in Computer Graphics*

Invited Colloquium Talk at St. Olaf College, 1997. Title: *Image-Based Rendering — Creating 3D models from photographs.*

Invited Colloquium Talk at St. Olaf College and Augsburg College, 1994-1995. Title: *Mathematical Aspects of Tracking in Virtual Reality.*

Lecturer and Co-Organizer for a graduate seminar on the mathematics of three dimensional motion in the computer science department of the University of North Carolina at Chapel Hill, 1993.

Invited organizer and speaker for a four hour mini-course on the mathematics of computer graphics, Joint Meeting of the American Mathematical Society and the Mathematical Association of America, January 1991.

Invited panelist, The Technological Imagination: Machines in the Garden of Art, Symposium held at The Minneapolis College of Art and Design, November, 1989.

Principal Speaker, Mathematical Association of America, North Central Section, Summer Seminar, Carleton College, June 1989. TITLE: *The Mathematics of Computer Graphics*, (Eight 75 minute lectures)

Technical Session address at SIGGRAPH '86, Dallas, Texas, August 1986. Title: *Fast Constructive Solid Geometry in the Pixel-Powers Graphics System.*

Invited Seminar talks at the University of North Carolina, Fall 1984.

Invited Colloquium Talks at St.Olaf College, Blackburn College, Hamline University, 1979-1982. Title: *Infinite Magic Squares.*

Invited twenty-minute talk at the Special Session on Homotopy Theory, AMS meeting 745, Northwestern University, April 1977.

REVIEWING AND REFEREEING

Panel member for National Science Foundation proposals submitted to the "Undergraduate Curriculum and Course Development in Engineering, Mathematics, and the Sciences" Program, Washington DC, February 1991.

Book Reviewer for the MAA Telegraphic Reviews, 1977 to present.

Referee for the *American Mathematical Monthly* and *Mathematics Magazine*

Referee for *IEEE Computer Graphics and Applications*

Referee for *ACM SIGGRAPH Technical Session 1987-89*

TEACHING

Calculus Instructor for the Institute for Teachers of Talented High School Students, Carleton College, Summer 1980-1983.

Reader for the Educational Testing Service AP Calculus Exam Trenton NJ, 1980-1983.

Table Leader for the Educational Testing Service AP Calculus Exam Trenton NJ, 1984-1991.

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

American Mathematical Society

Mathematical Association of America

Association for Computing Machinery

SIGGRAPH

AWARDS AND GRANTS

Principal Investigator, National Science Foundation ILI grant DUE-9451438. Project Title: An Improved Computer Graphics Laboratory for Computer Science and Mathematics. September 1, 1994 - August 31, 1996.

Research Opportunity Award, National Science Foundation, to support a year-long sabbatical leave at the University of North Carolina-Chapel Hill computer science department, 1992-1993.

Principal Investigator, National Science Foundation CSIP grant 8750099. Project Title: An Undergraduate Computer Graphics Laboratory for Mathematics and Computer Science. June 1987 - November 1989.

PUBLICATIONS

"Methods to Identify Individual Eddy Structures in Turbulent Flow", (with Wang, S., Longmire, E., Interrante, V.), Tsinghua Science and Technology Special Issue on Visualization and Computer Graphics, Vol. 18, No. 2, April 2013, pp 125-136.

"Adaptive Redirected Walking in a Virtual World", (with Interrante V.), *IEEE Workshop on Perceptual Illusions in Virtual Environments*, 2012, 22-25.

"A Novel Cubic-Order Algorithm for Approximating Principal Direction Vectors", (with Interrante, V.), *ACM Transactions on Graphics*, Vol. 23, No. 1, January 2004, 45-63.

"Tracking in Virtual Reality", *Math Horizons*, February 2003: 27-31.

"Using Quadratic Forms to Correct Orientation Errors in Tracking", *Mathematics Magazine*, Vol. 69, No. 2, April 1996: 110-114.

"A Heterogeneous Multiprocessor Graphics System Using Processor-Enhanced Memories", (with H. Fuchs, et. al.), *Computer Graphics*, Vol. 23, August, 1989: 79-88.

"Near Real-Time CSG Rendering Using Tree Normalization and Geometric Pruning" (with S. Molnar. G. Turk, and H. Fuchs), *IEEE Computer Graphics and Applications*, Vol. 9, No. 3, May, 1989: 20-28.

"Fast Constructive Solid Geometry Display in the Pixel-powers Graphics System" (with J. Hultquist and H. Fuchs), *Computer Graphics*, Vol. 20, No. 4, August 1986: 107-116.

"Quadratic Surface Rendering on a Logic-Enhanced Frame-Buffer Memory" (with H.Fuchs),*IEEE Computer Graphics and Applications*, Vol. 6, January 1986: 48-59. Reprinted in: H. Reghbati and A. Lee. *Computer Graphics Hardware — Image Generation and Display.* Computer Society Press, 1988.

"Pixel-Planes: Building a VLSI-Based Graphic System" (with J.Poulton, H.Fuchs, J.D.Austin, J.Eyles, J.Heinecke, C.Hsieh, J.P.Hultquist, S.Spach), *Proc. Chapel Hill Conference on VLSI*, May 1985: 35-60. Reprinted in: H. Reghbati and A. Lee. *Computer Graphics Hardware — Image Generation and Display.* Computer Society Press, 1988.

"Fast Spheres, Shadows, Textures, Transparencies, and Image Enhancement in Pixel-Planes" (with H.Fuchs, J.P.Hultquist, S.Spach, J.D.Austin, J.G.Eyles, J.Poulton), *Computer Graphics*, Vol. 19, No. 3, July 1985: 111-120. (Reprinted in *Advances in Computer Graphics*, Springer-Verlag, 1986: 169-187) Reprinted in: H. Reghbati and A. Lee. *Computer Graphics Hardware — Image Generation and Display.* Computer Society Press, 1988.

"Splitting Infinite Abelian Groups" (with Steven Galovich, Kay Smith, Stan Seltzer), *Aequationes Mathematicae*, Vol. 30, January 1986:123-133.

"Certain Secondary Operations That Detect Incompressible Maps", *Illinois Journal of Mathematics*, Vol. 26 No. 3, Fall 1982:412-418.

"Incompressibility and Fibrations", *Illinois Journal of Mathematics*, Vol. 21 No. 3, September 1977:688-702.

"Compressible Maps", *Proceedings of the American Mathematical Society*, Vol. 60, October 1976:339-342.