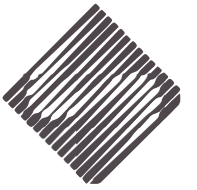
ACM SIGGRAPH Video Review
Issue 50



Special issue on Visualization in Scientific Computing, July 1989.

TABLE OF CONTENTS

ACM SIGGRAPH Video Review Issue 50

Special issue on Visualization in Scientific Computing, July 1989.

1. Pittsburgh Supercomputing Center '89

Contact:

Joel Welling
Pittsburgh Supercomputing Center (PSC)
Mellon Institute
Fifth Avenue
Pittsburgh, PA 15213
(412) 268-6350

Credits:

Matt Tolbert, Joel Welling and Phil Andrews. Narration by Joel Welling. Collaborators include: Allen Schiano, Arthur Wolfe, Marc Berger, Bill Eddy, Phil Nicoletti, Robert Dick, Joe Fridy, Mark Christon, Ming Jing Huang, Keith Poole, Howard Rosenthal, Greg McRae and Carlos Belo.

Technical Notes:

Eleven research animations are shown, including the formation of a protogalaxy, fractal/Markov chain image-encoding techniques, a distributed matrix eigenvalue solver, minimal spanning trees, a model of a tank of coal dust supported by a rising column of air, finite element analysis of aluminum beverage cans and pipes, temperature gradients in an ice lattice, the dynamics of hydrate crystal lattices containing trapped hydrocarbon molecules, voting patterns of the U.S. House of Representatives, the effect of automobile fuels on ozone levels, and the effect of multiple applications of a statistical filter on a 2D statistical sample.

Hardware: Cray X-MP/48 and Cray Y-MP/832; Peritek-based animation system with a Diaquest controller; Sony U-matic tape player.

Software: NCARGHS; DI/3000; DISSPLA, Drawcom and Chaprets graphics software packages; GPLOT graphics driver.

2. Interaction of Cosmic Jets with an Intergalactic Medium

Contact:

T. Todd Elvins
San Diego Supercomputer Center (SDSC)
P.O. Box 85608
San Diego, CA 92138
(619) 534-5128

Credits:

T. Todd Elvins and Anke Kamrath (SDSC); Dave DeYoung (Kit Peak Observatory).

Technical Notes:

Radio observation of the heavens reveals active galaxies with black holes at their cores expelling jets of matter

(cosmic jets) that extend across space for hundreds of thousands of light years. Cosmic jets are often bent, sometimes as much as 90 degrees, and some jets have multiple bends. Theory suggests they are bending around large-scale density inhomogeneities in ambient medium/big clouds of cooler/denser plasma. This simulation depicts a jet meeting single and multiple clouds of plasma that cause it to bend. There are 1,000 time steps, mapped by temperature, density, and then velocity.

Hardware: Simulation on Cray X-MP; Imaging on a Sun 3/160 hosting a Pixar. Software: Pixar ChapVolumes, SDSC data conversion software, 3D hydrodynamics simulation code.

3. SDSC Scientific Visualization '88

Contact:

Mark Sheddon
San Diego Supercomputer Center (SDSC)
P.O. Box 85608
San Diego, CA 92138
(619) 534-5130

Credits:

M. Sheddon, S. Lamont, M. Keeler, H. Horton, D. Hessler, T. Elvins, B. Webb, J. Frank (SDSC); Scientists: M. Gurnis (CIT), B. Hager (CIT), W. Gekelman (UCLA), D. Bercovici, G. Schubert, D. Meier (JPL), D. Payne (JPL), S. Young (UCSD), M. Ellisman (UCSD).

Technical Notes:

Excerpts from selected animations done at SDSC are presented, including architectural design, the tearing of an electron current sheet, animation of nerve cells, supercontinent aggregation and dispersal, planetary convections, cosmic jets and graphic design.

Hardware: Cray X-MP/48, IRIS 4D/70GT, SCS-40, Ardent Titan, VAX, MAC II; Recording on a Dicomed D48/CR (film) and Betacam (video).

Software: Alias, Movie.BYU, FPSLIB, ImageTool, SYNU (local rendering package), Doré.

4. Monte Carlo Simulation of Excited Electrons in GaAs

Contact:

Dan Brady
National Center for Supercomputing Applications (NCSA)
605 E. Springfield Ave.
Champaign, IL 61820
(217) 244-2003

Credits:

Research by Daniel W. Bailey, Christopher J. Stanton and Karl Hess (University of Illinois at Urbana-Champaign); Animation by Mark Bajuk (NCSA Scientific Visualization Program).

Technical Notes:

The distribution function from an ensemble Monte Carlo simulation of the femtosecond relaxation of optically-excited electrons is shown in the first Brilliuion Zone. Zero time is set at the center point. Hardware: Alliant VFX-80; Silicon Graphics IRIS 3130; Abekas A62; Sun 360. Software: In-house and Wavefront.

5. Molecular Diffusion on a Crystal Gold Surface

Contact:

Dan Brady
National Center for Supercomputing Applications (NCSA)
605 E. Springfield Ave.
Champaign, IL 61820
(217) 244-2003

Credits:

Research by Joseph W. Lyding, Jerome S. Hubacek and Roger T. Brockenbrough (University of Illinois at Urbana-Champaign); Animation by Mark Bajuk (NCSA Scientific Visualization Program).

Technical Notes:

Four time sequences show the diffusion of physisorbed molecules on a single crystal gold surface, studied using scanning tunneling microscopy. Hardware: Alliant VFX-80; Silicon Graphics IRIS 3130; Abekas A62; Sun 360. Software: In-house and Wavefront.

6. Two-Armed Instability of a Rotating Polytropic Star

Contact:

Dan Brady
National Center for Supercomputing Applications (NCSA)
605 E. Springfield Ave.
Champaign, IL 61820
(217) 244-2003

Credits:

Research by Richard Durisen, Shelby Yang and Robert Grabhorn (Department of Astronomy, Indiana University); Animation by Jeff Yost (NCSA Scientific Visualization Program).

Technical Notes:

The stability of rapidly rotating astrophysical bodies of all types (stars, planets, galaxies and disks) are a subject of active study. This simulation shows the consequences of a particular type of instability, referred to as fission, where the star is expected to distort and break apart. In this case, however, a binary star system does not develop; the end state is a bar plus a ring.

Hardware: Alliant VFX-80; Silicon Graphics IRIS 3130; Abekas A62; Sun 360. Software: In-house and Wavefront.

7. Large-Scale Structure in the Universe

Contact:

Dan Brady
National Center for Supercomputing Applications (NCSA)
605 E. Springfield Ave.
Champaign, IL 61820
(217) 244-2003

Credits:

Research by Brent Tully (Institute for Astronomy, University of Hawaii); Animation by Michelle Mercer (NCSA Scientific Visualization Program).

Technical Notes:

This animation shows structure in the distribution of galaxies. The galaxies are displayed on three scales: (1) our local cloud of galaxies, the Coma-Sculptor Cloud, (2) the Local Supercluster, and (3) a display of structure on a scale of a tenth the present event horizon.

Hardware: Alliant VFX-80; Silicon Graphics IRIS 3130; Abekas A62; Sun 360. Software: In-house and Wavefront.

8. Enzyme Reaction in Triophosphate Isomerase

Contact:

Dan Brady
National Center for Supercomputing Applications (NCSA)
605 E. Springfield Ave.
Champaign, IL 61820
(217) 244-2003

Credits:

Research by Paul Bash and Martin Karplus (Department of Chemistry, Harvard University); Animation by Stefen Fangmeier (NCSA Scientific Visualization Program).

Technical Notes:

This animation consists of four sequences: (1) diffusion of a substrate (DHAP) into an active site of the enzyme, (2) transfer of a proton from the methylene group of DAAP to glutamate — 165 of TIM, (3) HIS-95 facilitating proton transfer between two oxygens on the substrate, and (4) final proton transfer and diffusion away from the enzyme reaction.

Hardware: Alliant VFX-80; Silicon Graphics IRIS 3130; Abekas A62; Sun 360. Software: In-house and Wavefront.

9. Quantum Molecular Dynamics

Contact:

Dan Brady
National Center for Supercomputing Applications (NCSA)
605 E. Springfield Ave.
Champaign, IL 61820
(217) 244-2003

Credits:

Research by Paul Bash, Martin Karplus and Martin Field (Department of Chemistry, Harvard University); Animation by Matthew Arrott, Michelle Mercer and Jeff Yost (NCSA Scientific Visualization Program).

Technical Notes:

Molecules of methyl chloride, appearing as they would in a water solution, exhibit their methyl groups exchanging chlorine atoms while bombarding water molecules slow down their reaction. Hardware: Alliant VFX-80; Silicon Graphics IRIS 3130; Abekas A62; Sun 360. Software: In-house and Wavefront.

10. Cajon Pass Scientific Drilling Project

Contact:

Dan Brady
National Center for Supercomputing Applications (NCSA)
605 E. Springfield Ave.
Champaign, IL 61820
(217) 244-2003

Credits:

Research by Colleen Barton and Mark Zoback (Department of Geophysics, Stanford University); Animation by Jeff Yost (NCSA Scientific Visualization Program).

Technical Notes:

This animation was created from data recorded in the Cajon Pass Well, drilled to investigate the stresses in Earth's crust in the vicinity of the San Andreas Fault. The data was measured by a borehole televiewer which recorded the reflectivity. Topographic information was used to construct a core-like image of the drillhole with the reflectivity values superimposed in color.

Hardware: Alliant VFX-80; Silicon Graphics IRIS 3130; Abekas A62; Sun 360. Software: In-house and Wavefront.

11. Topology of Coma Supercluster Region

Contact:

Dan Brady
National Center for Supercomputing Applications (NCSA)
605 E. Springfield Ave.
Champaign, IL 61820
(217) 244-2003

Credits:

Research by Jack Burns (Department of Astrophysics, University of New Mexico); Animation by Stefen Fangmeier (NCSA Scientific Visualization Program).

Technical Notes:

This simulation examines the 3D distribution of galaxies near the Coma Supercluster. Hard-

ware: Alliant VFX-80; Silicon Graphics IRIS 3130; Abekas A62; Sun 360. Software: In-house and Wavefront.

12. VIEW: Ames Virtual Environment Workstation

Contact:

Scott Fisher
NASA Ames Research Center
M/S 239-3
Moffett Field, CA 94035
(415) 694-6789

Credits:

S. Fisher, C. Coler and E. Wenzel (NASA); M. Bolas, S. Bryson, R. Jacoby, D. Kerr, I. MacDowall and P. Stone (Sterling); C. Wiedmann (UC Berkeley).

Technical Notes:

Demonstration scenarios show real-time interaction within a 360-degree, stereoscopic, computer-generated, virtual environment by means of a head-mounted display, datagloves and auditory cues. ISG Technologies.

For information regarding purchase of the SIGGRAPH Video Review tapes contact:

ACM Order Department
P. O. Box 64145
Baltimore, MD 21264
(800) 342-66264