ACM SIGGRAPH VIDEO REVIEW

ISSUE 108

Scientific Visualization 1995

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1. Cosmic Spectacle: Gravitational Lensing in the Vicinity of a Schwarzschild Black Hole

Time: 00:03:15

Summary:
An algorithm has been implemented which permits the output of numerical computations defining the degree of curvature of light rays as a function of their proximity to a black hole to be used to generate geometric information which can then be input into a scanline renderer to produce an animated visualization of gravitational lensing phenomena. Although the Schwarzschild scenario employed thus far represents a highly simplified mathematical representation, the animation displays distinctive and readily identifiable patterns highly susceptible to visual analysis.

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2. Evolution of Black Holes

Time: 00:09:35

Summary:
Visualization of gravitational waves from distorted Black Holes.

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3. Dwarf Formation

Time: 00:00:30

Summary:
When spiral galaxies interact, streamers of stars and gas are thrown off. This animation shows a Dwarf Galaxy Formation when clumps in these streamers collapse. The blue and green points represent stars and gas. The parent galaxy and another spiral galaxy are shown in red. The resulting dwarf galaxy is about 25% gas as compared to 10% for its parent galaxy.

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4. Computing the Universe: X-ray Clusters in a Cold + Hot Dark Matter Universe

Time: 00:09:20

Summary:
Visualization of the formation of X-ray emitting gas clusters.

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5. Comet Shoemaker-Levy 9 and Planet Jupiter: An Introductory Representation of the Impact

Time: 00:01:41

Summary:
'Comet Shoemaker- Levy 9 and Planet Jupiter: An Introductory Representation of the Impact' is an educational animation designed to precede a researcher's scientific visualizations. The events leading to the impact and related background information are explained in simple terms.

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6. Ionospheric Dynamics

Time: 00:01:13

Summary:
Simulation of the response of electron density drifting through geomagnetic activity in the upper (350km) ionosphere. Simulations were developed for both summer and winter conditions in the polar ionosphere.

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7. The Miami Isopycnic Coordinate Ocean Model

Time: 00:01:48

Summary:
'The Miami Isopycnic Coordinate Ocean Model' animation shows simulated sea surface temperatures of the Gulf Stream, an important North Atlantic Ocean current.

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8. Bering Glacier Surge

Time: 00:01:35

Summary:
The surge of the Bering Glacier in southeast Alaska was captured on a series of ERS-1 SAR images between November 1992 and October 1993. Using image analysis software at the Alaska SAR Facility, the images were radiometrically calibrated, terrain corrected and coregistered to produce a time lapse animation of the glacier surge.

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9. Ocean Circulation Model: Walleye Pollock Survival

Time: 00:00:32

Summary:
A regional ocean circulation model is used to study the movement of walleye pollock eggs and larvae in the Gulf of Alaska relative to various physical factors which influence the survivability of the larvae.

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10. Study of Severe Rainfall Events in Northwestern Peru

Time: 00:02:02

Summary:
The ordinary arid climate of coastal Peru is disturbed every few years by a phenomenon called El Nino, characterized by a warming in the Pacific Ocean. Severe rainstorms are one of the consequences of El Nino, which cause great damage. An examination of daily data from sixty six rainfall stations in the Chiura-Piura region of northwestern Peru from late 1982 through mid-1983 yields information on the mesoscale structure of these storms.

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11. Tornado Watch (Run Toto, Run!)

Time: 00:01:00

Summary:

'Tornado Watch (Run Toto, Run!)' is an animation of storm simulation data. While rain water and cloud water are represented by gray isosurfaces and wind velocity by blue ribbons, the primary interests is in the red isosurfaces showing high vorticity potentially spawning tornadoes.

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12. Computational Steering with VisAD

Time: 00:06:16

Summary:

The VisAD system integrates visualization with a high-level interpreted programming language to enable interactive steering and visualization of scientific computations as they run. Scientists can define data types appropriate for a wide variety of applications, and can control how the variables of their applications are mapped to graphical space, to animation, to color, and so on. The first segment illustrates the basics of running algorithms and displaying data objects. The second segment illustrates the basics of interactive steering through an algorithm for computing Julia sets. The third segment illustrates a more sophisticated application of computational steering to perform numerical experiments with a shallow water model. The fourth segment illustrates the use of multiple displays defined by different sets of scalar mappings. The VisAD system is available at http://www.ssec.wisc.edu/~billh/vis.html

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13. TEMPEST: Computer Simulations of Nuclear Waste Processes

Time: 00:08:09

Summary:
Visualizations of computer simulations of nuclear waste processes.

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14. Example of Helix-Helix Packing

Time: 00:01:41

Summary:
'Example of Helix-Helix Packing' is an educational animation describing helices packing in a protein. Shown through different views is how the green sidechains from the blue helix form a ridge which fits into the groove defined by the yellow sidechains of the red helix.

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15. 3-D Reconstruction of Gastric Efferent Neurons in the Brainstem of the Rat

Time: 00:04:17

Computer animation and volume rendering techniques were combined to illustrate the steps involved in performing 3-D reconstructing of gastric efferent neurons in the rat brainstem. Retrograde tracing, immunocytochemistry and confocal microscopy were used to identify and examine neurons and surrounding nerve fibers. Using data from a confocal microscope and volume rendering software, a 3-D reconstruction was obtained that illustrates the spatial relationship of immunoreactive nerve fibers to a retrogradely-labled neuron.

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