Journal of Visualization, Vol. 10, No. 4 (2007) 337

Portfolio Paper

Three-Dimensional Materialisation of Motion through the Integration of Digital Media and Physical Form

Mann, G. C.*
* Product Artist, London, United Kingdom. URL: www.mrmann.co.uk
E-mail: mail@mrmann.co.uk
Received 31 January 2007 and Revised 26 April 2007

Fig. 1. Flight – Landing
The translucent nature of glass exemplifies the ephemeral nature of motion.
650 mm x 350 mm x 400 mm
Mfr. Cast Optical Glass.

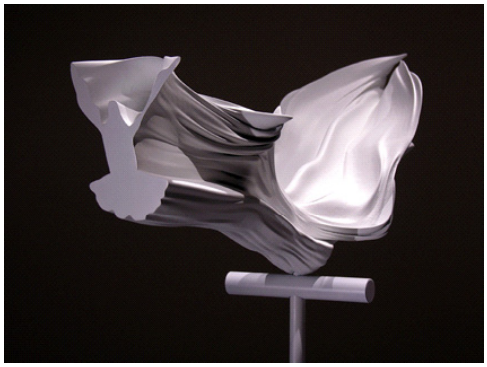


Fig. 2. Flight – Landing
Materializes the solid echo of a birds flight pattern.
650 mm x 350 mm x 400 mm
Mfr. Z-corp.

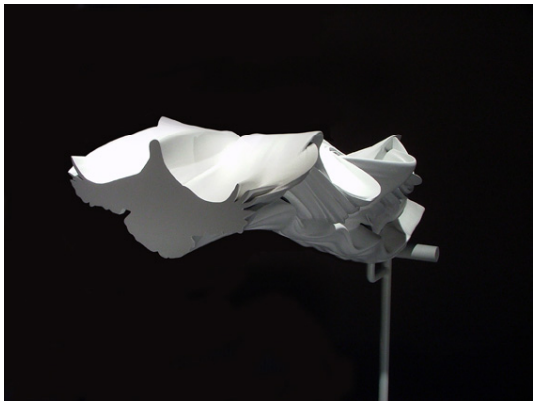


Fig. 3. Flight – Takeoff
The sculpture's final suspended presence creates an essence of the absolute, reality's true aesthetic captured within a moment in time.
650 mm x 350 mm x 400 mm
Mfr. Z-corp.

Fig. 4. Attracted to light
Narrates the erratic trajectory of a moth upon seeing a light source.
250 mm x 300 mm x 350 mm
Mfr. Nylon.

These figures explore the materialisation of motion's unseen metaphysical change. The *Long Exposure* series depicts the unseen trace-echo of a bird or moths' flight path. Through utilising cinematography technology to capture the intermediary phases of the subjects' trajectory; a continual sinuous passage within time and space is contextualized through *motion engendering form*. These kinematographical sculptures reconstruct pure sensation in objective terms, through synthesising the temporal processes of movement. Materialised through rapid-prototyping technology these apparitions create a unique haptic experience.

Journal of Visualization, Vol. 10, No. 4 (2007) 338

Portfolio Paper

Meandering Jet in a Rotating Stratified Fluid

Voropayev, S. I.*[1,2]
*1 Arizona State University, Tempe, AZ 85287-9809, USA. E-mail: s.voropayev@asu.edu
*2 Institute of Oceanology, Russian Academy of Sciences, Moscow, 117851, Russia.
Received 26 April 2007 and Revised 18 May 2007

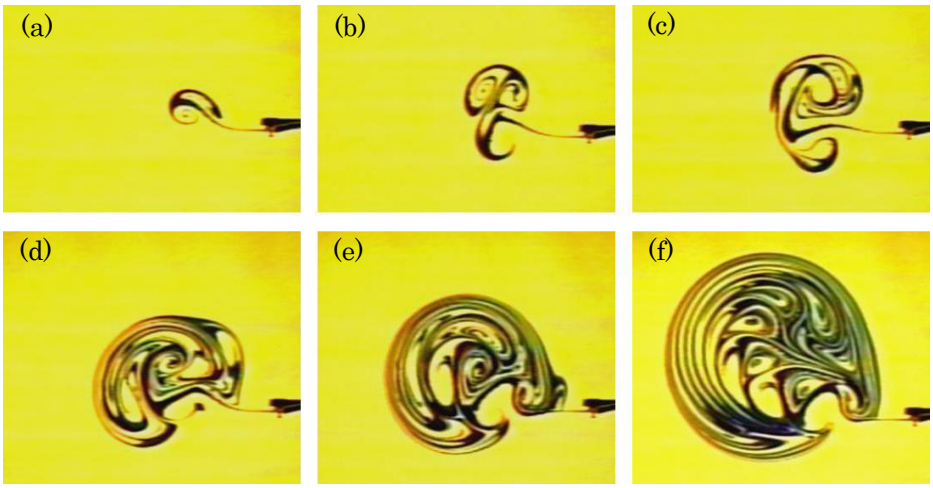


Fig. 1. In this experiment a jet from small round nozzle acts horizontally (from right to left, *Re* = 150) in the depth of a linearly stratified (N = 1.7 s^{-1}) rotating fluid. Fluid rotates anticlockwise (f = 0.2 s^{-1}). Thymol blue visualization. Surrounding fluid is slightly acidic (yellow) and the jet fluid is slightly basic (blue). Top view photographs are shown. Time from the beginning of the experiment: t = 2 (a), 4 (b), 8 (c), 15 (d), 22 (e), 35 s (f).

Fig. 2. Formed self-propagating coherent eddy at t = 60 s. The width of the frame is 30 cm.

A starting horizontal jet in a rotating stratified fluid develops either in dipolar or monopolar regimes depending on the flow parameters which are the ratio of the buoyancy frequency, N, to the Coriolis parameter, f, and the jet Reynolds number, Re. In the intermediate case the jet is meandering, switching from one regime to another (Fig. 1) with frequency f, forming with time, t, large self-propagating coherent structure (Fig. 2). Such eddies are observed frequently in the ocean. They have (linear) momentum and can drift hundreds of kilometers sometime crossing the Atlantic Ocean. A theory for such flows is given in Voropayev et al. (1997)[1].

References : (1) Voropayev, S. I., Zhang, X., Boyer, D. L., Fernando, H. J. S. and Wu, P. C., Horizontal jets in a rotating stratified fluid, Physics of Fluids, 9 (1997), 115-126.

Journal of Visualization, Vol. 10, No. 4 (2007) 339

Portfolio Paper

Cyclone.soc: an Interactive Artwork Visualizing Internet Newsgroup Postings as Cyclonic Weather Conditions

Corby, T.*[1] and Baily, G.*[2]

*1 Hypermedia Research Centre, University of Westminster, Harrow, London HA1 3TP, United Kingdom. E-mail: tom@athomas.demon.co.uk

*2 Space Syntax Limited, London, E1 5LN, United Kingdom. E-mail: gavin@baily.net

Received 22 January 2007 and Revised 28 September 2007

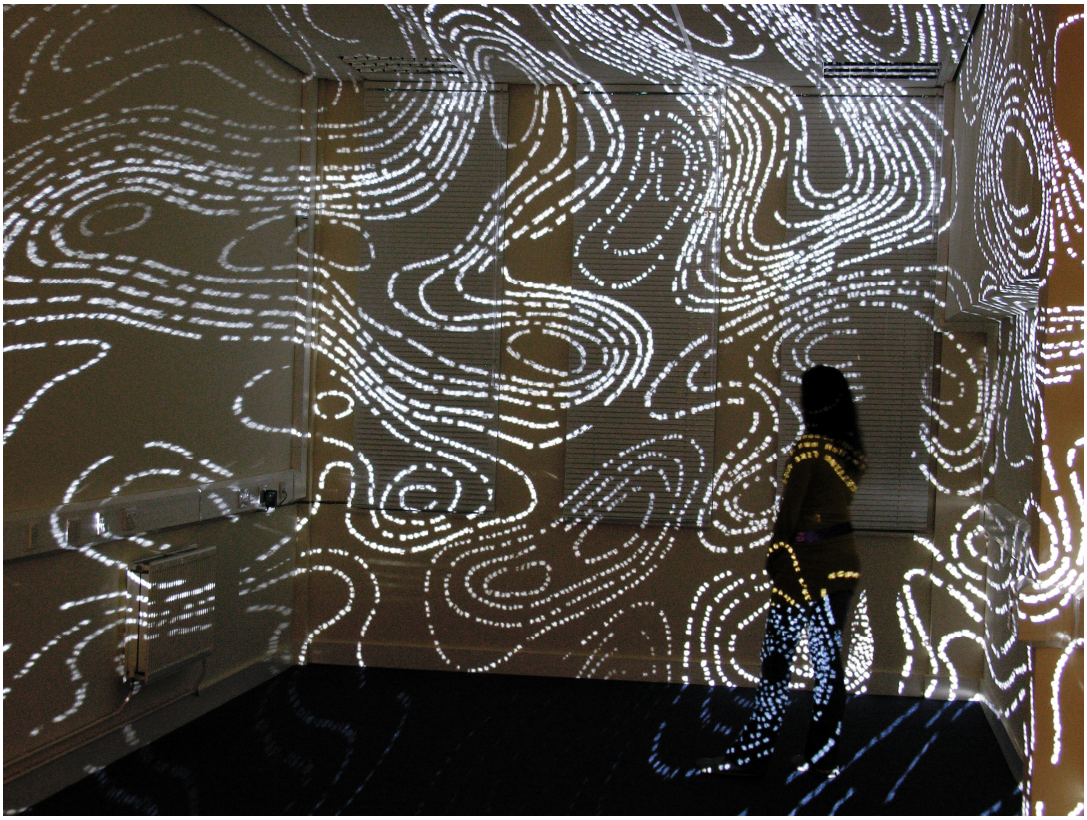


Fig. 1. *Cyclone.soc* exhibited at Perimeters Boundaries and Borders, Lancaster UK, 2006. Image shows a visitor immersed in virtual storm fronts. Photograph John Marshall.

The artwork *Cyclone.soc*, is an immersive interactive environment that combines Internet debates between extremist religious and political groups with severe weather conditions. Streamed live, newsgroup postings are fitted to the atmospheric topologies of visualizations of cyclonic weather fronts to give the effect of the conversational churn and eddy of newsgroup argument and counter-argument. Postings can then be read by either walking round the space or using controls to manoeuvre to specific formations and conversations. The project uses an edited concentrate of data from different storms derived from publicly available satellite forecasting for the eastern coast of the United States during the autumn of 2005. The information was then re-worked as vector animations traced from the original isobar projections in adobe Illustrator and given depth, dimension and interactivity by being re-programmed using the open GL platform. In resituating newsgroup postings as weather precipitation, the project frees pictorial elements to act as metonyms for different types of cultural and ideological tension enabled and produced through technological domains and develops a suggestive link between these extreme belief systems and their potential wider ecological impacts on the material world.

Further information about this project can be found at the artist's website: http://www.reconnoitre.net.

Journal of Visualization, Vol. 10, No. 4 (2007) 340

Portfolio Paper

Analysis of Wake Flow around a Circular Cylinder by Real-Time Color Denisyuk Holographic Interferometry

Desse, J. M.*[1] and Tribillon, J. L.*[2]

*1 Office National d'Etudes et de Recherches Aérospatiales (ONERA), Centre de Lille, 5, Boulevard Paul Painlevé, 59045 Lille Cedex, France.
E-mail: Jean-Michel.Desse@onera.fr

*2 DGA,DSP/MRIS, 8, Boulevard Victor, 75015, Paris Cedex 15, France.

Received 23 March 2007 and Revised 30 August 2007

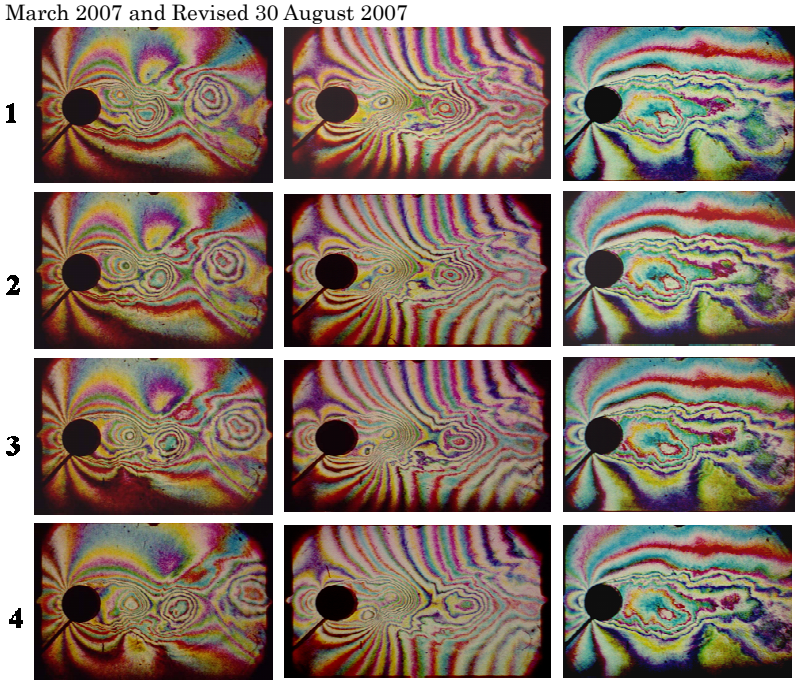


Fig. 1. High speed holographic interferograms –Δt = 54 μs – Mach 0.45.

ONERA and DGA have shown the feasibility of real-time color Denisyuk holographic interferometry for analyzing high speed flows. In this technique, the light source used behind the interferometer is constituted by a krypton laser (λ_1 = 647 nm), a green line (λ_2 = 532 nm) and a blue line (λ_2 = 457 nm) from two diode pump solid state lasers. An acousto optical cell diffracts the unwanted lines of the argon and krypton laser in the light mask and does not deviate the three wanted patterns that are generated by three appropriate frequencies. A spatial filter and an achromatic lens are used to illuminate the hologram with a parallel light beam of 120 mm in diameter. A flat mirror located just behind the test section containing the object returns the three beams on the hologram. Hologram is illuminated on the two sides by the three divergent reference beams and the three convergent measurement waves. In this setup, a beam splitter polarizing cube is inserted between the spatial filter and the hologram. The half quarter plate turns the waves polarization twice so that, when the rays are returning, the beam splitter cube returns the rays towards the screen. Contrary to the optical setup developed for the analysis of the 2D flows, in the one proposed for 3D flows, reflection holograms are used. In the case of reflection holograms, the diffraction efficiency is strongly influenced by the variations in the gelatin thickness produced during the holograms treatment. Solutions are proposed to control the gelatin shrinkage and the first results obtained in wind tunnel are shown in one sight of view. In this study, the diffraction efficiency of the hologram is near 50 % for each line. High speed interferograms of unsteady wake flow around a circular cylinder have been obtained in narrowed fringes and uniform background at Mach 0.45. Here, contrary to differential interferometry which visualizes the gradient of the gas density, each color directly visualizes a value of gas density itself.

Portfolio Paper

ScientificVR Capabilities in Magnetic Resonance Visualization

Zibarov, A. V.*, Karpov, A. N.*, Medvedev, A. V.*, Elesin, V. V.*, Orlov, D. A.*, Komarov, I. Y.*

* GDT Software Group, Tula, Russia. URL: www.cfd.ru ; E-mail: info@cfd.ru

Received 7 June 2006 and Revised 13 July 2007

Fig. 1. Kidneys and retroperitoneal space arteries magnetic resonance tomography visualization.

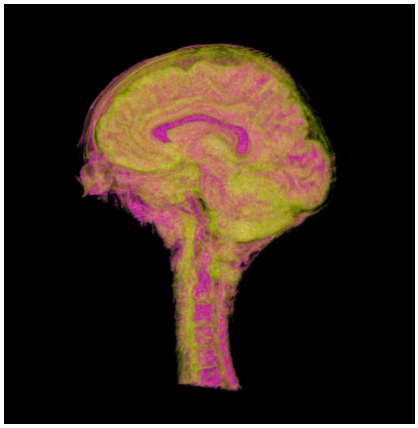


Fig. 2. Cerebrum magnetic resonance tomography visualization.

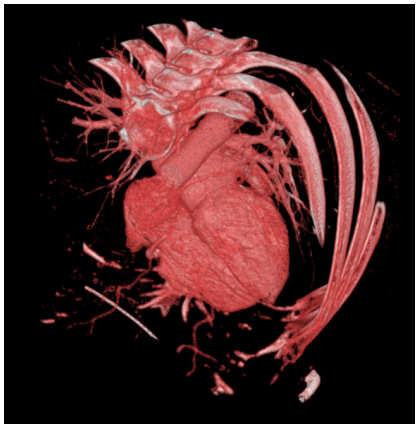


Fig. 3. Heart magnetic resonance tomography visualization.

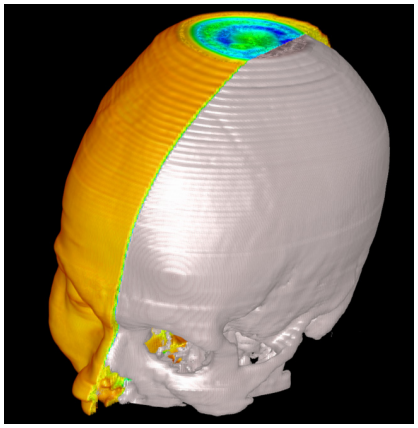


Fig. 4. Head magnetic resonance tomography visualization.

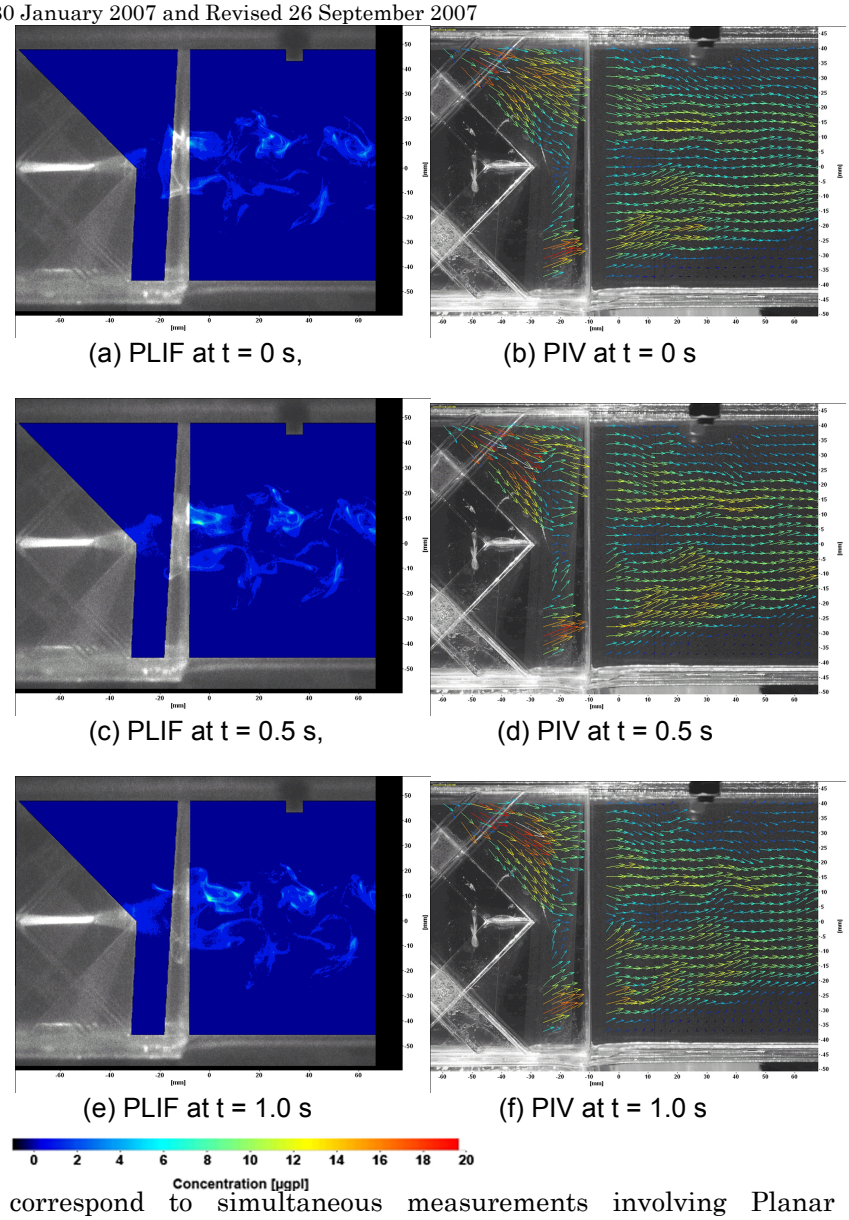
The figures show the GDT Software Group's ScientificVR® (SVR) package application for a 3D visualization of magnetic resonance (MR) tomography results, kindly given by the Russian Cardiological Scientific Production Center, www.cardioweb.ru. The visualization results are presented, using the semitransparent voxel technique in iso-surface realization. Figure 1 shows a 3D image of a part of kidneys and retroperitoneal space arteries. Figure 2 shows a 3D image of a part of a cerebrum and spinal cord. 3D image of a part of a heart, coronary arteries and a spinal column are shown in Fig. 3, and a 3D image of a part of a head, the one half of which is skin naked, is shown in Fig. 4. The section one can see on the head top (Fig. 4) is caused by and corresponds to the visualized domain boundary. The possibility of voxel transparency adjustment and an image rotation is an important advantage of this kind of MR data presentation approach, as it allows seeing an inside of a 3D object visualized providing a more informative and meticulous examination. The SVR resolution conforms to the tomograph resolution in full. This enables to give an opportunity to reconstruct data obtained for any plane or visualize a number of human organs. Stereoscopic visualization support can increase the efficiency of the voxel technology. The color coding of pictures could be chosen in accordance with a user request.

Journal of Visualization, Vol. 10, No. 4 (2007) 342

Portfolio Paper

Fluid Dynamics and Mixing Behavior of a SMX-Type Static Mixer

Leschka, S.*, Thévenin, D.*, Zähringer, K.* and Lehwald, A.*
* Lab. of Fluid Dynamics and Technical Flows, Otto-von-Guericke-Universität Magdeburg, Universitätsplatz 2, 39106 Magdeburg, Germany.
E-mail: dominique.thevenin@vst.uni-magdeburg.de
Received 30 January 2007 and Revised 26 September 2007



These images correspond to simultaneous measurements involving Planar Laser-induced Fluorescence (PLIF, left) and Particle Image Velocimetry (PIV, right) for the examination of mixing processes in a static mixer at Re = 562. For PLIF, Rhodamine 6G is injected on the centerline in front of the mixer. The PLIF images have been acquired using an intensified CCD camera during the first of two PIV laser pulses (NdYAG, 532 nm, 80 mJ per pulse), while the CCD camera used for PIV takes double images, used to calculate the two-dimensional velocity fields. Thanks to these measurements it becomes possible to characterize quantitatively the flow behind the static mixer, in particular to determine characteristic flow frequencies as well as correlations between velocity and concentrations.