

PAPERS PUBLISHED USING THE TSI® V3V™ AND V3V-FLEX SYSTEMS



2008 Award Winner



BIBLIOGRAPHY (A4)

Journal Publications

2017

LeClaire, Paul D., Ting, Francis C.K. (2017) Measurements of suspended sediment transport and turbulent coherent structures induced by breaking waves using two-phase volumetric three-component velocimetry, *Coastal Engineering* **121**: 56-76, <http://dx.doi.org/10.1016/j.coastaleng.2016.11.008>.

2016

Musta, Mustafa (2016) Interaction of a Vortex Ring with a Cutting Thin Plate, *APS Division of Fluid Dynamics (Fall) 2015, abstract #L19.00*, *Measurement* **88**, June 2016, 104–112, doi: [10.1016/j.measurement.2016.03.040](http://dx.doi.org/10.1016/j.measurement.2016.03.040)

2015

Gemmell BJ, Troolin DR, Costello JH, Colin, SP, Satterlie RA (2015) Control of Vortex Rings for Manoeuvrability, *J. R. Soc. Interface*, 2015038, doi: [10.1098/rsif.2015.0389](http://dx.doi.org/10.1098/rsif.2015.0389).

Ting F, Reimnitz J (2015) Volumetric velocity measurements of turbulent coherent structures induced by plunging regular waves, *Coastal Engineering* **104**: 93-112, doi: [10.1016/j.coastaleng.2015.07.002](http://dx.doi.org/10.1016/j.coastaleng.2015.07.002).

2014

Wahidi R, Hubner J, Zhang Z (2014), 3-D measurements of separated flow over rigid plates with spanwise periodic cambering at low Reynolds number, *Journal of Fluids and Structures*, **49**, Aug. 2014, p. 263–282, doi: [10.1016/j.jfluidstructs.2014.04.016](http://dx.doi.org/10.1016/j.jfluidstructs.2014.04.016).

Weißmann S, Pinkall U, Schröder P (2014) Smoke Rings from Smoke. *ACM Trans. Graph.* **33**, 4, Article 140 (July 2014), 8 pp, doi: [10.1145/2601097.2601171](http://dx.doi.org/10.1145/2601097.2601171).



2013

Cambonie T, Gautier N, Aider JL (2013) Experimental study of counter-rotating vortex pair trajectories induced by a round jet in cross-flow at low velocity ratios, *J. Exp. Fluids* **54**: 1475, doi: [10.1007/s00348-013-1475-9](https://doi.org/10.1007/s00348-013-1475-9).

Chamorro L, Troolin D, Lee S, Arndt R, Sotiropoulos F (2013) Three dimensional flow visualization in the wake of a miniature axial-flow hydrokinetic turbine, *Exp. in Fluids*, **54**:1459, doi [10.1007/s00348-013-1459-9](https://doi.org/10.1007/s00348-013-1459-9).

Cheng B, Roll J, Liu Y, Troolin D R, Deng X (2013) Three Dimensional Vortex Wake Structure of Flapping Wings in Hovering Flight, *Journal of the Royal Society Interface*, doi: [10.1098/rsif.2013.0984](https://doi.org/10.1098/rsif.2013.0984).

Cheng B, Sane S P, Barbera G, Troolin D R, Strand T, Deng X (2013) Three-dimensional flow visualization and vorticity dynamics in revolving wings, *Exp. in Fluids*, **54** (1), pp. 1-12, doi: [10.1007/s00348-012-1423-0](https://doi.org/10.1007/s00348-012-1423-0).

Kalmbach A, Breuer M (2013) Experimental PIV/V3V measurements of vortex-induced fluid-structure interaction in turbulent flow—A new benchmark FSI-PfS-2, *Journal of Fluids and Structures*, Volume **42**, p. 369-387, doi:[10.1016/j.jfluidstructs.2013.07.004](https://doi.org/10.1016/j.jfluidstructs.2013.07.004).

Liu Y, Bo C, Barbera G, Troolin D, Deng X (2013) Volumetric visualization of the near and far-field wake in flapping wings, *Bioinspiration & Biomimetics* **8**, 8pp, doi: [10.1088/1748-3182/8/3/036010](https://doi.org/10.1088/1748-3182/8/3/036010).

Le TB, Troolin D, Amatya D, Longmire EK, Sotiropoulos F (2013) Vortex Phenomena in Sidewall Aneurysm Hemodynamics: Experiment and Numerical Simulation, *Annals of Biomedical Engineering*, **41**(10):2157-70, doi: [10.1007/s10439-013-0811-9](https://doi.org/10.1007/s10439-013-0811-9).

2012

Calderon D E, Wang Z, Gursul I (2012) Volumetric Measurements and Simulations of the Vortex Structures Generated by Low Aspect Ratio Plunging Wings, AIAA 2012-0914. *50th AIAA Aerospace Sciences Meeting*, 9-12 January 2012, Nashville, TN, USA, doi: [10.1063/1.4808440](https://doi.org/10.1063/1.4808440).

Calderon D E, Wang Z, Gursul I (2012) Three-dimensional measurements of vortex breakdown, *Exp. in Fluids*, **53**:293-299, doi: [10.1007/s00348-012-1317-1](https://doi.org/10.1007/s00348-012-1317-1).

Cleaver DJ, Wang Z, Gursul I (2012) Oscillating Flexible Wings at Low Reynolds Numbers, *51st AIAA Aerospace Sciences Meeting including the New Horizons Forum and Aerospace Exposition*. American Institute of Aeronautics and Astronautics, 2013, doi: [10.2514/6.2013-674](https://doi.org/10.2514/6.2013-674).

Flammang BE, Lauder GV, Troolin DR, Strand TE (2012) Cover image, *Integrative and Comparative Biology*, vol. **52**.

Wahidi R, Lai W, Hubner J, Lang A, (2012) Time-Averaged and Time-Resolved Volumetric Velocimetry Measurements of a Laminar Separation Bubble on an Airfoil. *European Journal of Fluid Mechanics*, **41**, Sept.–Oct. 2013, p. 46–59, doi:[10.1016/j.euromechflu.2013.04.003](https://doi.org/10.1016/j.euromechflu.2013.04.003).

2011

Couch L, Krueger P (2011) Experimental investigation of vortex rings impinging on inclined surfaces, *Experiments in Fluids*, doi: [10.1007/s00348-011-1135-x](https://doi.org/10.1007/s00348-011-1135-x).

Flammang, B.E., Lauder, G.V., Troolin, D.R., Strand, T.E. (2011) Volumetric imaging of shark tail hydrodynamics reveals a three-dimensional dual-ring vortex wake structure. *Proceedings of the Royal Society of London B*. **278**, pp. 3670 –3678, doi: [10.1098/rspb.2011.0489](https://doi.org/10.1098/rspb.2011.0489).

Flammang, B.E., Lauder, G.V., Troolin, D.R., Strand, T.E. (2011) Volumetric imaging of fish locomotion. *Biology Letters* **7**, pp. 695–698, doi: [10.1098/rsbl.2011.0282](https://doi.org/10.1098/rsbl.2011.0282).

Flammang, B E, Lauder, G V, Troolin, D R, and Strand, T E (2011) Volumetric imaging of shark tail hydrodynamics reveals a three-dimensional dual-ring vortex wake structure. *Proceedings of the Royal Society of London B*, doi: [10.1098/rspb.2011.0489](https://doi.org/10.1098/rspb.2011.0489).

Flammang, B E, Lauder, G V, Troolin, D R, and Strand, T E (2011) Volumetric imaging of fish locomotion. *Biology Letters* 7, pp. 695–698, [doi: 10.1098/rsbl.2011.0282](https://doi.org/10.1098/rsbl.2011.0282).

Kim D, Gharib M (2011) Flexibility effects on vortex formation of translating plates, *J. Fluid Mech.*, vol. 677, pp. 255–271, [doi: 10.1017/jfm.2011.82](https://doi.org/10.1017/jfm.2011.82).

Lauder G, Lim J, Shelton R, Witt C, Anderson E, Tangorra J (2011) Robotic Models for Studying Undulatory Locomotion in Fishes, *Biomimetics and Marine Technology*. Vol. 45(4).

Le T B, Borazjani I, Kang S, Sotiropoulos F (2011) On the structure of vortex rings from inclined nozzles, *Journal of Fluid Mechanics*, vol. 686, pp. 451-483, [doi: 10.1017/jfm.2011.340](https://doi.org/10.1017/jfm.2011.340).

Wolf E, Kaehler C J, Troolin D R, Kykal C, Lai W (2011) “Time-resolved volumetric particle tracking velocimetry of large-scale vortex structures from the reattachment region of a laminar separation bubble to the wake,” *Experiments in Fluids*, 50(4), pp. 977-88, [doi: 10.1007/s00348-010-0973-2](https://doi.org/10.1007/s00348-010-0973-2).

2010

Kim D, Gharib M (2010) “Experimental study of three-dimensional vortex structures in translating and rotating plates,” *Experiments in Fluids*, 49, pp. 329–339, [doi: 10.1007/s00348-010-0872-6](https://doi.org/10.1007/s00348-010-0872-6).

Wolf E, Kaehler C J, Troolin D R, Kykal C, Lai W (2010) “Time-resolved volumetric particle tracking velocimetry of large-scale vortex structures from the reattachment region of a laminar separation bubble to the wake,” *Experiments in Fluids*, 50(4), pp. 977–88, [doi: 10.1007/s00348-010-0973-2](https://doi.org/10.1007/s00348-010-0973-2).

2009

Sharp K, Hill D, Troolin D, Walters G, and Lai W (2009) “Volumetric 3-component velocimetry measurements of the turbulent flow around a Rushton turbine,” *Experiments in Fluids*, 48(1), pp. 167–183, [doi: 10.1007/s00348-009-0711-9](https://doi.org/10.1007/s00348-009-0711-9).

Troolin D, Longmire E.K. (2009) “Volumetric Velocity Measurements of Vortex Rings from Inclined Exits,” *Experiments in Fluids*, 48(3), pp. 409-420, [doi: 10.1007/s00348-009-0745-z](https://doi.org/10.1007/s00348-009-0745-z).

2008

Felice F, Pereira F (2008) “Developments and Applications of PIV in Naval Hydrodynamics,” *Topics in Applied Physics*, Volume 112/2008, pp. 475-503, [doi: 10.1007/978-3-540-73528-1_26](https://doi.org/10.1007/978-3-540-73528-1_26).

2006

Pereira F, Stuer H, Graff E, Gharib M (2006) Two-frame 3D particle tracking, *Meas. Sci. Technol.* 17 pp. 1680–1692, [doi: 10.1088/0957-0233/17/7/006](https://doi.org/10.1088/0957-0233/17/7/006).

Conference Proceedings

2016

Konig J, Kykal C, Kiebert F, Boomsma A, Schmidt H (2016) “Measurement of the 3D particle velocity and temperature distribution induced by surface acoustic waves using V3V-Flex volumetric PIV and PLIF”, *18th International Symposium on Application of Laser Techniques to Fluid Mechanics*, Lisbon, Portugal, July 04–07, 2016.

Lespinasse F, Kocher A, Foucher F (2016) “Volumetric 3-Component Velocimetry measurements inside of a fan-stirred spherical vessel”, *18th International Symposium on Application of Laser Techniques to Fluid Mechanics*, Lisbon, Portugal, July 04–07, 2016.

Tan YM, Troolin DR, Lai WT, Longmire EK (2016) “Volumetric measurements of vortex packet recovery downstream of a perturbation,” *18th International Symposium on Application of Laser Techniques to Fluid Mechanics*, Lisbon, Portugal, July 04–07, 2016.

2015

Boomsma A, Troolin D, Lai W (2015) "V3V Volumetric PIV: New Developments in Particle Reconstruction," *11th International Symposium on Particle Image Velocimetry – PIV'15*, Santa Barbara, CA, USA, Sept. 14-16, 2015.

Toloui M, Lai W, Troolin D, Hong J (2015) "3D Turbulent Flow Measurements Combining V3V and Digital Inline Holographic PIV," *11th International Symposium on Particle Image Velocimetry – PIV'15*, Santa Barbara, CA, USA, Sept. 14-16, 2015.

Wahidi R, Olcmen S, Lai W, (2015) "Volumetric Three-Component Measurements of Air Jet Flows of Different Diffuser Designs," *53rd AIAA Aerospace Sciences Meeting*, Kissimmee, Florida, [doi: 10.2514/6.2015-1521](https://doi.org/10.2514/6.2015-1521).

2014

Blois G, Barros JM, Tang Z, Best JL, Troolin D, Lai W, Christensen KT (2014) "Planar and Volumetric Quantification of Flow Associated with Interacting Barchan Dunes," *17th International Symposium on Application of Laser Techniques to Fluid Mechanics*, Lisbon, Portugal, July 07–10, 2014.

Troolin D, Lai W, Hamed A, Yin J, Zuniga C, Chamorro L (2014) "Flow-structure interaction of falling cones in unbounded flow media," *67th Annual Meeting of the APS Division of Fluid Dynamics*, San Francisco, CA, November 23–25, 2014.

2013

Kalmbach A, Breuer M, De Nayer G (2013) "A new turbulent three-dimensional benchmark FSI-PfS-2, Definition and Measurements," *Computational Methods in Marine Engineering V, MARINE 2013*, At Hamburg, Germany.

Troolin D (2013) "Volumetric velocity field downstream of a 2-bladed turbine blade," *66th Annual Meeting of the APS Division of Fluid Dynamics*, Pittsburgh, PA, November 24–26, 2013.

Troolin D; Lee S; Chamorro L (2013) "Time-resolved volumetric measurements of the interaction between energetic coherent motions and tip vortices in the wake of an axial-flow marine turbine," *10th International Symposium on Particle Image Velocimetry – PIV'13*, Delft, The Netherlands, July 2-4, 2013.

2012

Fourrie G, Tounsi N, Stefanini J, Hyde M, Boussemart D, Oualli H, Keirsbulck L, Hanchi S, Labraga L (2012) "Volumetric 3-component Velocimetry measurement of the flow around the Ahmed body with a passive flow control," *16th Int. Symp. on Appl. Laser Techniques in Fluid Mechanics*, Lisbon, Portugal, July 09-12, 2012.

Gemmell BJ; Costello J; Colin S; Dabiri J; Adhikari D; Troolin D; Sheng J; Longmire E (2012) "Position Control in Jellyfish: Abandoning radial symmetry to create inclined, asymmetric vortex rings," *2012 Ocean Sciences Meeting*, Salt Lake City, UT, February 20-24, 2012.

Troolin D; Chamorro L; Lee S; Arndt R; Sotiropoulos F (2012) "Three dimensional visualization of the interaction between energetic coherent motions and tip vortices in the wake of an axial-flow marine turbine," *65th Annual Meeting of the APS Division of Fluid Dynamics*, San Diego, CA, November 18–20, 2012.

Troolin D, Chamorro L, Lee S (2012) "Volumetric Velocity Measurements on Underwater Turbines," *16th Int. Symp. on Appl. Laser Techniques in Fluid Mechanics*, Lisbon, Portugal, July 09-12, 2012.

Wahidi R, Lai W, Hubner JP, Lang A, (2012) "Volumetric Three-Component Velocimetry and PIV Measurements of Laminar Separation Bubbles on a NACA4412 Airfoil," *16th Int. Symp. on Appl. Laser Techniques in Fluid Mechanics*, Lisbon, Portugal, July 09-12, 2012.

2011

Lee S; Chamorro L; Troolin D; Arndt R; Sotiropoulos F (2011) "Spatial characterization of underwater turbine wakes using Three-dimensional three-component (3D3C) velocity measurements," *64th Annual Meeting of the APS Division of Fluid Dynamics*, Baltimore, MD, November 20–22, 2011.

Ortiz-Dueñas C, Ryan M D, Longmire E K (2011) "Modification of Turbulent Boundary Layer Structure Using Immersed Wall-mounted Cylinders," *Seventh International Symposium On Turbulence and Shear Flow Phenomena (TSFP-7)*, Ottawa, CA, July 28–31, 2011.

Troolin D R, Chamorro L P (2011) "Spatial characterization of underwater turbine wakes using Volumetric 3-Component Velocimetry," *9th International Symposium on Particle Image Velocimetry – PIV'11*, Kobe, Japan, July 21–23, 2011.

Wahidi R, Lai W, Smith, Lang A, Hubner (2011) "Measurements of Laminar Separation Bubbles on a NACA4412 Airfoil using a 3D3C Measurement Technique," *9th International Symposium on Particle Image Velocimetry – PIV'11*, Kobe, Japan, July 21–23, 2011.

2010

Flammang B, Lauder G, Troolin D, Strand T (2010) "Instantaneous Volumetric Wake Analysis of Locomotion in Teleost Fishes," *Best Poster, Society for Integrative & Comparative Biology Annual Meeting Conference*, Seattle, WA, Jan. 3-7, 2010.

Lai W (2010) "Quantitative flow visualization of wave formation using 3D3C Measurements Technique," *International Symposium on Hydraulic Physical Modeling and Field Investigation*, Nanjing, China, Sept. 13–15, 2010.

Ryan M, Ortiz- Dueñas C, Longmire E K, Troolin D (2010) "Effect of wall-mounted cylinders on a turbulent boundary layer: V3V measurements," *63rd Annual Meeting of the APS Division of Fluid Dynamics*, Long Beach, CA, November 21–23, 2010.

Troolin D, Amatya D, Longmire E K (2010) "Experimental Volumetric Velocity Measurements on Flows through an Aneurysm," *63rd Annual Meeting of the APS Division of Fluid Dynamics*, Long Beach, CA, November 21–23, 2010.

2009

Pothos S, Troolin D, Lai W, Menon R (2009) "V3V – Volumetric Three-Component Velocimetry for 3D Flow Measurements – Main Principle, Theory and Applications," *ISGE 2009 Conference*, Cluj-Napoca, ROMANIA, May 14–16, 2009.

Troolin D, Amatya D, Longmire E (2009) "3D3C Velocity Measurements Downstream of Artificial Heart Valves," *8th International Symposium on Particle Image Velocimetry*, Melbourne, Victoria, Australia, August 25–28, 2009.

Wolf E, Kaehler C, Troolin D, Kykal C, Lai W (2009) "Time-Resolved Volumetric Separation Measurement in a Towing Tank using the TSI V3V Measurement System," *8th International Symposium on Particle Image Velocimetry*, Melbourne, Victoria, Australia, August 25–28, 2009.

2008

Graff E, Pereira F, Gharib M (2006) "Visualization of Bubbly Propeller Flow with Defocusing Digital Particle Image Velocimetry," *12th International Symposium on Flow Visualization*, September 10–14, 2006, German Aerospace Center (DLR), Germany.

Hill D; Troolin D, Walters G, Lai W, Sharp K (2008) Volumetric 3-Component Velocity (V3V) Measurements of the turbulent flow in stirred tank reactors," *14th Int. Symp. on Appl. Laser Techniques in Fluid Mechanics*, Lisbon, Portugal, July 7-10, 2008.

Lai W, Pan G, Menon R, Troolin D, Graff E, Gharib M, Pereira F (2008) "Volumetric 3-Component Velocimetry: A New Tool for 3D Flow Measurement," *14th Int. Symp. on Appl. Laser Techniques in Fluid Mechanics*, Lisbon, Portugal, July 7–10, 2008.

Menon R, Troolin D, Lai W (2008) "Volumetric Three Dimensional Flow Measurements," *61st Annual Meeting of the APS Division of Fluid Dynamics*, San Antonio, Texas, November 23–25, 2008.

Menon R, Troolin D (2008) "Volumetric 3-Component Measurements Using V3V – An Innovative Approach to Instantaneous 3D Flow Measurement," *Proceedings of the 12th Asian Congress of Fluid Mechanics*, Daejeon, Korea, 18–21 August 2008.

Pan G, Lai W, Graff E, Gharib M, Menon R, Zhang H (2008) "Quantitative 3D Flow Visualization using Volumetric 3-Component Velocimetry," *13th International Symposium on Flow Visualization*, Nice, France, July 1–4, 2008.

Pan G, Troolin D, Bjorkquist D, Zhang H, Lai W (2007) "Volumetric Three-Component Velocimetry," *60th Annual Meeting of the Division of Fluid Dynamics*, Salt Lake City, Utah, November 18–20, 2007.

Troolin D, Longmire E (2008) "A Study of Vortex Rings from Cylinders with Inclined Exits Using V3V," *61st Annual Meeting of the APS Division of Fluid Dynamics*, San Antonio, Texas, November 23–25, 2008.

Troolin D, Hambleton W, Lai W (2008) "Volumetric measurements in bubbly wakes using V3V," *61st Annual Meeting of the APS Division of Fluid Dynamics*, San Antonio, Texas, November 23–25, 2008.

Troolin D, Longmire E (2008) "Volumetric 3-Component Velocity Measurements of Vortex Rings from Inclined Exits," *14th Int. Symp. on Appl. Laser Techniques in Fluid Mechanics*, Lisbon, Portugal, July 7-10, 2008.



UNDERSTANDING, ACCELERATED

TSI Incorporated – Visit our website www.tsi.com for more information.

USA Tel: +1 800 874 2811
UK Tel: +44 149 4 459200
France Tel: +33 1 41 19 21 99
Germany Tel: +49 241 523030

India Tel: +91 80 67877200
China Tel: +86 10 8219 7688
Singapore Tel: +65 6595 6388