

# **Flow Imaging Using Femtosecond Laser Induced Two-Photon Fluorescence**

**James B. Kelman and Douglas A. Greenhalgh**

Cranfield University, Cranfield, MK43 0AL, United Kingdom

**Euan Ramsay, Dong Xiao and Derryck T. Reid**

Ultrafast Optics Group, School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, E14 4AS, United Kingdom

A novel technique is demonstrated for the imaging of turbulent flows in which a single window to the flow is the only optical access required. A femtosecond laser is used to excite two-photon fluorescence in a disodium fluorescein-seeded water jet. The fluorescence signal is generated only at the focal point of the laser due to the highly non-linear nature of the two-photon absorption and is collected in a direction counter-propagating to the excitation beam. Tight focusing of the laser is used to limit the probe volume and the two dimensional mean and RMS concentration images are collected by raster scanning the laser.

Copyright

OCIS codes: (110.2970) Imaging Systems: Image Detection Systems; (140.7090) Lasers and Laser Optics: Ultrafast Lasers; (280.2490) Remote Sensing: Flow Diagnostics; (280.7090) Remote Sensing: Turbulence; (300.2530) Fluorescence: Laser Induced

# Flow imaging using femtosecond-laser-induced two-photon fluorescence

Kelman, J. B.

2004-08

---

James B. Kelman, Douglas A. Greenhalgh, Euan Ramsay, Dong Xiao, Derryck T. Reid, Flow imaging by use of femtosecond-laser-induced two-photon fluorescence, *Optics Letters*, Volume 29, Issue 16, 1873-1875, August 2004

<http://hdl.handle.net/1826/892>

*Downloaded from CERES Research Repository, Cranfield University*