

# Dominic Jones

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## Professional work

Sep 2016 – Present	<b>Director, Netherhall House, London</b> Jointly responsible for the academic, cultural and formational activities of the hall of residence for university students.
Jul 2016 – Sep 2017	<b>Consultant, CD-adapco / Siemens PLM, London</b> Designed a compile-time methodology for generating the adjoint derivative of a function. This research work is a proposed tool to complement the existing abstractions for implementing the adjoint of the Navier-Stokes equations in Star-CCM+, an engineering software simulation package from CD-adapco.
Jan 2012 – Jul 2016	<b>Senior developer, CD-adapco, London</b> Designed and implemented most of the adjoint differentiation of the Navier-Stokes equations in Star-CCM+, along with its low-level testing framework. The work of implementing the adjoint derivative touched most of the code-base, of which I contributed more than 300,000 lines of code. Alongside the work, I initiated a professional development course at CD-adapco, running a series of presentations on C++, examining common pitfalls, new features, idioms, and reflection techniques.
Apr 2009 – Dec 2011	<b>Post-doctoral research, Queen Mary, University of London</b> Developed a source-code transformation approach to generating the adjoint derivative of the Navier-Stokes equations. This approach was then applied to commercial software. In addition, a domain-decomposed parallel implementation of a Navier-Stokes solver was written in order to explore the extension of the approach to parallel algorithms.

## Education

Sep 2005 – Jan 2009	<b>Doctoral research, University of Manchester</b> Attempted to resolve the Further Work of two theses on simulating spray propagation and impaction, from an Eulerian frame of reference. This work presented solutions to spray edge capturing, the inversion of probability density functions, capturing flow details at very small scales, and interaction of interpenetrating sprays. During my research, I tutored and ran laboratory work for second and third year Thermodynamics, Fluid Dynamics and Programming, and helped with open day laboratory presentations in the department.
Sep 2002 – Jun 2005	<b>Bachelor of Mechanical Engineering, UMIST, Manchester</b> Specialised in Thermodynamics and Computational Fluid Dynamics. The final year project examined the behaviour of LPG fuel sprays using an academic spray simulation code.

## Academic topics

CD / Siemens	Adjoint Differentiation using C++14 EDSLs
CD-adapco	Differentiation Techniques via EDSLs   C++ in depth   Parsing, Expression Trees   Code Analysis, Machine Architecture
Post-doc	Automatic Differentiation   Parallel Computation, Domain Decomposition, Message Passing   Optimisation Techniques
Ph.D	Computational Fluid Dynamics   Linear Solvers   Probability Density Functions   Spray Hydrodynamics   Mesh, Graph and Matrix Representations
BEng	Thermodynamics   Fluid Dynamics   Computational Fluid Dynamics

## Selected Presentations and Publications

D. P. Jones. Block scope differentiation. In *7th International Conference on Algorithmic Differentiation*, Oxford, UK, September 2016. SIAM

D. P. Jones. Discrete adjoint; an industrial perspective. 14<sup>th</sup> European Workshop on Automatic Differentiation, Oxford University, December 2013

J.-D. Muller, D. P. Jones, W. Jahn, and S. Xu. Discrete adjoint solvers for industrial design optimisation. In *Conference on Industrial Design Optimisation for Fluid Flow*, Munich, Germany, March 2012. Technical University Munich

D. P. Jones and A. P. Watkins. Droplet size and velocity distributions for spray modelling. *Journal of Computational Physics*, 231(2):676–692, July 2012

D. P. Jones, J.-D. Muller, and F. Christakopoulos. Preparation and assembly of adjoint cfd codes. In Peter K. Sweby, editor, *10th ICFD Conference Series on Numerical Methods for Fluid Dynamics*, volume 46, pages 282–286, Reading, UK, July 2011. Computers & Fluids

D. P. Jones, J.-D. Muller, and J. Riehme. Discrete adjoint of the incompressible Navier-Stokes equations. 11<sup>th</sup> European Workshop on Automatic Differentiation, Oxford University, December 2010

D. P. Jones, F. Christakopoulos, and J.-D. Muller. Adjoint cfd codes through automatic differentiation. In A. Sequeira J. C. F. Pereira and J. M. C. Pereira, editors, *Proceedings of the V European Conference on Computational Fluid Dynamics*, Lisbon, Portugal, June 2010. ECCOMAS CFD

D. P. Jones, J.-D. Muller, and J. Riehme. Discrete adjoint of the incompressible Navier-Stokes equations. 11<sup>th</sup> European Workshop on Automatic Differentiation, Oxford University, December 2010

D. P. Jones and A. P. Watkins. Spray impingement model based on the method of moments. *ILASS-Europe*, 2008

D. P. Jones. Spray modelling using the method of moments. CoMo Group, Department of Chemical Engineering and Biotechnology, Cambridge University, December 2008