

## Dr David Leppinen PhD

Senior Lecturer

[School of Mathematics \(/schools/mathematics/index.aspx\)](/schools/mathematics/index.aspx)

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### About

Dr David Leppinen is a Senior Lecturer in Applied Mathematics.

He has extensive experience applying mathematics to examine Industrial processes. His research has been recognized with a Patent for the design of a dissolved air flotation and has been exhibited at the Royal Society's Summer Science Festival and on the BBC News 24 Science Review.

David is currently interested in studying the dynamics of free surface flows, particularly the compressible and incompressible dynamics of bubbles and droplets.

### Qualifications

- PhD in Mathematics (1997)
- BMath (Hons) in Applied Mathematics with Engineering Electives (1993)

### Biography

David Leppinen graduated with a Honours BMath (Co-operative) degree in Applied Mathematics with Engineering Electives from the University of Waterloo, Canada (1993). He went on to study for a PhD in the Department of Applied Mathematics and Theoretical Physics at the University of Cambridge, where he combined experimental, analytical and numerical techniques to study problems in single and double diffusive convection.

David continued his PostDoctoral training at DAMTP studying aspects of Dissolved Air Flotation (culminating in a successful patent application), droplet pinch-off and the Rayleigh-Taylor instability culminating in promotion to Deputy Director of the GK Batchelor Fluid Dynamics Laboratory.

He joined the School of Mathematics at the University of Birmingham as a lecturer in January 2005. His research has continued to focus on the dynamics of bubbles and droplets, including the important bio-medical application of decompression sickness. Recent interest has extended to using skills in numerical analysis to examine the dynamics of fuel cells.

### Teaching

- Single Honours Mathematics (G100, G103, G141)
- Mathematics Majors: Mathematics with Business Management (G1N2); Mathematics with Engineering (J920); Mathematics with Philosophy (G1V5)
- Joint Honours Mathematics: Mathematics & Computer Science (GG14); Pure Mathematics & Computer Science (GGC4); Mathematics & Sport Science (GC17); Mathematics & Music (GW13); Mathematics & Philosophy (GV15)
- Theoretical Physics and Applied Mathematics (FG31)
- Mathematics Minors: French Studies and Mathematics (GR11); German Studies and Mathematics (GR12)
- Natural Sciences (CFG0, FCG0)

### Postgraduate supervision

Dr Leppinen has been involved in supervising PhD students in the areas of

- Hydraulics of Estuaries
- Bubble dynamics
- Applications of Ferrite Devices
- Dynamics of Fuel Cells

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### Research

#### RESEARCH THEMES

Dr Leppinen's strengths involve using numerical and asymptotic techniques to examine problems of practical industrial relevance. His experimental background provides a

firm physical understanding of a wide range of industrial and geophysical fluid flows.

Dr Leppinen is an expert in using the Boundary Integral technique to examine the influence of surface tension on inviscid fluid flows. He is also interested in employing high order finite difference and finite volume techniques to examine buoyancy generated flows.

## Publications

Eggers, J; Fonetelos, MA; Leppinen D; Snoeijer JH, 'Theory of the collapsing axisymmetric cavity', Phys Rev Lett, 88:9, pp 094502 (2007).

Leppinen DM; Dalziel SB, 'Bubble size distribution in dissolved air flotation tanks', J Water Supply Res – AQUA, 53:8, 531-543 (2004).

Leppinen D; Lister JR, 'Capillary pinch-off in inviscid fluids', Phys Fluids, 15:2, pp 568-578 (2003).

Leppinen DM, 'Natural Convection in shallow cylindrical annuli', Int J Heat Mass Transfer, 45:14, pp 2967-2981 (2002).

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