

## INDEX

- Amin, S.** *See* Schrader, Amin & Brandt
- Avila, M., Willis, A. P. & Hof, B.** On the transient nature of localized pipe flow turbulence, 127–136
- Balmforth, N. J.** *See* Cawthorn & Balmforth
- Balmforth, N. J., Cawthorn, C. J. & Craster, R. V.** Contact in a viscous fluid. Part II. A compressible fluid and an elastic solid, 339–361
- Bec, J., Biferale, L., Cencini, M., Lanotte, A. S. & Toschi, F.** Intermittency in the velocity distribution of heavy particles in turbulence, 527–536
- Biferale, L.** *See* Bec, Biferale, Cencini, Lanotte & Toschi
- Bonanos, A. M.** *See* Matheou, Bonanos, Pantano & Dimotakis
- Bottaro, A.** A ‘receptive’ boundary layer, 1–4
- Bracco, A. & McWilliams, J. C.** Reynolds-number dependency in homogeneous, stationary two-dimensional turbulence, 517–526
- Brandt, L.** *See* Schrader, Amin & Brandt
- Brandt, L. K. & Nomura, K. K.** Characterization of the interactions of two unequal co-rotating vortices, 233–253
- Carstensen, S.** *See* Sumer, Jensen, Sørensen, Fredsøe, Liu & Carstensen
- Carstensen, S., Sumer, B. M. & Fredsøe, J.** Coherent structures in wave boundary layers. Part 1. Oscillatory motion, 169–206
- Cawthorn, C. J.** *See* Balmforth, Cawthorn & Craster
- Cawthorn, C. J. & Balmforth, N. J.** Contact in a viscous fluid. Part I. A falling wedge, 327–338
- Cencini, M.** *See* Bec, Biferale, Cencini, Lanotte & Toschi
- Coffey, C. J.** *See* Hunt & Coffey
- Cooper, P. & Hunt, G. R.** The ventilated filling box containing a vertically distributed source of buoyancy, 39–58
- Craster, R. V.** *See* Balmforth, Cawthorn & Craster
- De Stefano, G. & Vasilyev, O. V.** Stochastic coherent adaptive large eddy simulation of forced isotropic turbulence, 453–470
- Dimotakis, P. E.** *See* Matheou, Bonanos, Pantano & Dimotakis
- Dixit, H. N. & Govindarajan, R.** Vortex-induced instabilities and accelerated collapse due to inertial effects of density stratification, 415–439
- Eckhardt, B.** *See* Schneider, Marin & Eckhardt
- Elfring, G. J., Pak, O. S. & Lauga, E.** Two-dimensional flagellar synchronization in viscoelastic fluids, 505–515
- Fredsøe, J.** *See* Carstensen, Sumer & Fredsøe
- Fredsøe, J.** *See* Sumer, Jensen, Sørensen, Fredsøe, Liu & Carstensen
- Goswami, P. S. & Kumaran, V.** Particle dynamics in a turbulent particle–gas suspension at high Stokes number. Part 1. Velocity and acceleration distributions, 59–90
- Goswami, P. S. & Kumaran, V.** Particle dynamics in a turbulent particle–gas suspension at high Stokes number. Part 2. The fluctuating-force model, 91–125
- Govindarajan, R.** *See* Dixit & Govindarajan
- Hanifi, A.** *See* Tempelmann, Hanifi & Henningson

- Henningson, D. S.** *See* Tempelmann, Hanifi & Henningson
- Hof, B.** *See* Avila, Willis & Hof
- Hunt, G. R.** *See* Cooper & Hunt
- Hunt, G. R. & Coffey, C. J.** Emptying boxes – classifying transient natural ventilation flows, 137–168
- Jensen, P. M.** *See* Sumer, Jensen, Sørensen, Fredsøe, Liu & Carstensen
- Koch, D. L.** *See* Raja, Subramanian & Koch
- Kumaran, V.** *See* Goswami & Kumaran
- Kumaran, V.** *See* Goswami & Kumaran
- Lanotte, A.** *See* Bec, Biferale, Cencini, Lanotte & Toschi
- Lauga, E.** *See* Elfring, Pak & Lauga
- Le Dizès, S.** *See* Schaeffer & Le Dizès
- Liu, P. L.-F.** *See* Sumer, Jensen, Sørensen, Fredsøe, Liu & Carstensen
- Marinc, D.** *See* Schneider, Marinc & Eckhardt
- Matheou, G., Bonanos, A. M., Pantano, C. & Dimotakis, P. E.** Large-eddy simulation of mixing in a recirculating shear flow, 375–414
- McWilliams, J. C.** *See* Bracco & McWilliams
- Nomura, K. K.** *See* Brandt & Nomura
- Okamura, M.** Almost limiting short-crested gravity waves in deep water, 481–503
- Pak, O. S.** *See* Elfring, Pak & Lauga
- Pantano, C.** *See* Matheou, Bonanos, Pantano & Dimotakis
- Raja, R. V., Subramanian, G. & Koch, D. L.** Inertial effects on the rheology of a dilute emulsion, 255–296
- Schaeffer, N. & Le Dizès, S.** Nonlinear dynamics of the elliptic instability, 471–480
- Schneider, T. M., Marinc, D. & Eckhardt, B.** Localized edge states nucleate turbulence in extended plane Couette cells, 441–451
- Schrader, L.-U., Amin, S. & Brandt, L.** Transition to turbulence in the boundary layer over a smooth and rough swept plate exposed to free-stream turbulence, 297–325
- Shaw, S. J. & Spelt, P. D. M.** Shock emission from collapsing gas bubbles, 363–373
- Spelt, P. D. M.** *See* Shaw & Spelt
- Subramanian, G.** *See* Raja, Subramanian & Koch
- Sumer, B. M.** *See* Carstensen, Sumer & Fredsøe
- Sumer, B. M., Jensen, P. M., Sørensen, L. B., Fredsøe, J., Liu, P. L.-F. & Carstensen, S.** Coherent structures in wave boundary layers. Part 2. Solitary motion, 207–231
- Sørensen, L. B.** *See* Sumer, Jensen, Sørensen, Fredsøe, Liu & Carstensen
- Tempelmann, D., Hanifi, A. & Henningson, D. S.** Spatial optimal growth in three-dimensional boundary layers, 5–37
- Toschi, F.** *See* Bec, Biferale, Cencini, Lanotte & Toschi
- Vasilyev, O. V.** *See* De Stefano & Vasilyev
- Willis, A. P.** *See* Avila, Willis & Hof



# ANNUAL REVIEWS

The Essential Resource for Chemical and Biomolecular Engineering Research

Annual Reviews offers comprehensive, timely collections of critical, topical reviews written by acknowledged experts. Annual Reviews journals examine 40 focused disciplines within the Biomedical, Life, Physical, and Social Sciences. Our Editorial Committees are specialists in selecting and synthesizing literature into concise, insightful review articles. As a result, Annual Reviews journals are among the most highly cited in scientific literature and are consistently ranked within the top ten of journals for their disciplines as indexed by the ISI® Journal Citation Reports (JCR®).

## **Annual Review of Chemical and Biomolecular Engineering**

Vol. 1 • July 2010 • Online & In Print • <http://chemeng.annualreviews.org>

Editor: John M. Prausnitz, *University of California, Berkeley*

The *Annual Review of Chemical and Biomolecular Engineering* will provide a perspective on the broad field of chemical (and related) engineering. It will address advances in applied chemistry and biology, with a focus on concepts, old and new materials, and/or processes. The series will draw from disciplines as diverse as biology, physics, and engineering, with development of chemical products and processes as the unifying theme.

This journal is of direct interest to readers with a general background in the natural sciences as well as for a broad range of scientists concerned with the physical, chemical, and biological properties of materials encountered in the contemporary and future chemical industries.

**Access this and all Annual Reviews journals via your institution's subscription at [www.annualreviews.org](http://www.annualreviews.org)**

Personal copies available at a reduced rate. Institutional site license options available. Contact Annual Reviews for details.

**ANNUAL REVIEWS • A Nonprofit Scientific Publisher • 40 Journals • Since 1932**

TEL: 800.523.8635 (US/CAN) • TEL: 650.493.4400 • FAX: 650.424.0910 • EMAIL: [service@annualreviews.org](mailto:service@annualreviews.org)



- 1 A 'receptive' boundary layer  
**A. Bottaro**
- 5 Spatial optimal growth in three-dimensional boundary layers  
**D. Tempelmann, A. Hanifi & D. S. Henningson**
- 39 The ventilated filling box containing a vertically distributed source of buoyancy  
**P. Cooper & G. R. Hunt**
- 59 Particle dynamics in a turbulent particle–gas suspension at high Stokes number. Part 1. Velocity and acceleration distributions  
**P. S. Goswami & V. Kumaran**
- 91 Particle dynamics in a turbulent particle–gas suspension at high Stokes number. Part 2. The fluctuating-force model  
**P. S. Goswami & V. Kumaran**
- 127 On the transient nature of localized pipe flow turbulence  
**M. Avila, A. P. Willis & B. Hof**
- 137 Emptying boxes – classifying transient natural ventilation flows  
**G. R. Hum & C. J. Coffey**
- 169 Coherent structures in wave boundary layers. Part 1. Oscillatory motion  
**S. Carstensen, B. M. Sumer & J. Fredsøe**
- 207 Coherent structures in wave boundary layers. Part 2. Solitary motion  
**B. M. Sumer, P. M. Jensen, L. B. Sørensen, J. Fredsøe, P. L.-F. Liu & S. Carstensen**
- 233 Characterization of the interactions of two unequal co-rotating vortices  
**L. K. Brandt & K. K. Nomura**
- 255 Inertial effects on the rheology of a dilute emulsion  
**R. V. Raja, G. Subramanian & D. L. Koch**
- 297 Transition to turbulence in the boundary layer over a smooth and rough swept plate exposed to free-stream turbulence  
**L.-U. Schrader, S. Amin & L. Brandt**
- 327 Contact in a viscous fluid. Part 1. A falling wedge  
**C. J. Cawthorn & N. J. Balmforth**
- 339 Contact in a viscous fluid. Part 2. A compressible fluid and an elastic solid  
**N. J. Balmforth, C. J. Cawthorn & R. V. Craster**
- 363 Shock emission from collapsing gas bubbles  
**S. J. Shaw & P. D. M. Spelt**
- 375 Large-eddy simulation of mixing in a recirculating shear flow  
**G. Matheou, A. M. Bonanos, C. Pantano & P. E. Dimotakis**
- 415 Vortex-induced instabilities and accelerated collapse due to inertial effects of density stratification  
**H. N. Dixit & R. Govindarajan**
- 441 Localized edge states nucleate turbulence in extended plane Couette cells  
**T. M. Schneider, D. Marinic & B. Eckhardt**
- 453 Stochastic coherent adaptive large eddy simulation of forced isotropic turbulence  
**G. De Stefano & O. V. Vasilyev**
- 471 Nonlinear dynamics of the elliptic instability  
**N. Schaeffer & S. Le Dizès**
- 481 Almost limiting short-crested gravity waves in deep water  
**M. Okamura**
- 505 Two-dimensional flagellar synchronization in viscoelastic fluids  
**G. J. Elfring, O. S. Pak & E. Lauga**
- 517 Reynolds-number dependency in homogeneous, stationary two-dimensional turbulence  
**A. Bracco & J. C. McWilliams**
- 527 Intermittency in the velocity distribution of heavy particles in turbulence  
**J. Bec, L. Biferale, M. Cencini, A. S. Lanotte & F. Toschi**
- 537 Book Review
- 540 INDEX TO VOLUME 646