

Catalogue of the papers and correspondence of

THOMAS BROOKE BENJAMIN FRS

(1929-1995)

Compiled by Jeannine Alton and Timothy E. Powell

Deposited in the Department of Western Manuscripts,
Bodleian Library,
Oxford

NCUACS 63/1/97

All rights reserved
University of Bath
1997

The work of the National Cataloguing Unit
for the Archives of Contemporary Scientists, and
the production of this catalogue, are made possible
by the support of the following societies and
organisations:

The Biochemical Society

The Geological Society

The Higher Education Funding Council for England

The Institute of Physics

The Royal Society

The Wellcome Trust

NOT ALL THE MATERIAL IN THIS COLLECTION
MAY YET BE AVAILABLE FOR CONSULTATION.
ENQUIRIES SHOULD BE ADDRESSED IN THE
FIRST INSTANCE TO:

THE KEEPER OF WESTERN MANUSCRIPTS
BODLEIAN LIBRARY
OXFORD

LIST OF CONTENTS

		Items	Page
GENERAL INTRODUCTION			4
SECTION A	BIOGRAPHICAL	A.1 - A.61	7
	Career, honours and awards	A.1 - A.25	8
	Music	A.26 - A.32	12
	Poetry	A.33 - A.55	13
	Photographs	A.56 - A.61	15
SECTION B	NOTES, DRAFTS AND CALCULATIONS	B.1 - B.165	16
	University teaching	B.1-B.17	17
	Other notes, drafts and calculations	B.18-B.165	18
SECTION C	LECTURES, CONFERENCES AND VISITS	C.1 - C.41	35
SECTION D	SOCIETIES AND ORGANISATIONS	D.1 - D.5	43
SECTION E	MATHEMATICS AND HIGHER EDUCATION	E.1 - E.18	45
	National Conference of University Professors (NCUP)	E.1-E.14	46
	Articles and writings	E.15 - E.18	48
SECTION F	CORRESPONDENCE	F.1 - F.20	49
INDEX OF CORRESPONDENTS			52

GENERAL INTRODUCTION

PROVENANCE

The papers were received from Mrs Natalia Benjamin (widow) and via Professor John Toland, School of Mathematical Sciences, University of Bath, at various dates in 1996.

OUTLINE OF THE CAREER OF THOMAS BROOKE BENJAMIN

Benjamin was born on 15 April 1929 in Wallasey, Merseyside, and educated at Wallasey Grammar School. He studied electrical engineering at Liverpool University 1947-1950, before moving to Yale University on a Rotary Foundation Fellowship to take an M.Eng. Benjamin then went to Cambridge University where he took his doctorate on cavitation in fluids. He was elected Fellow of King's College, Cambridge in 1955, and appointed Assistant Director of Research 1958-1967 and Reader in Hydrodynamics 1967-1970, working in the Department of Applied Mathematics and Theoretical Physics, Cambridge University, on problems of fluid dynamics such as thin films, wave instability, drag reduction, and vortex breakdown. He was elected Fellow of the Royal Society in 1966, at the early age of 36.

In 1970 Benjamin moved as Professor of Mathematics to the University of Essex, where he set up the Fluid Mechanics Research Institute, to promote interaction between mathematicians and experimentalists in advanced fluid mechanics. In 1979 he accepted appointment to the Sedleian Chair of Natural Philosophy at Oxford, which carried with it Fellowship of The Queen's College. Apart from periods as visiting professor at overseas universities, principally in America, Benjamin remained in Oxford until his death on 16 August 1995.

In addition to his contributions to the study of fluid dynamics, Benjamin retained a lifelong interest in music, as executant (piano and strings), conductor and composer. Somewhat later in life, he also turned to the composition of poetry.

Benjamin was twice married: in 1956 to Helen Ginsburg, by whom he had a son and two daughters; the marriage was dissolved in 1974. In 1978 he married Natalia Court, by whom he had a daughter.

DESCRIPTION OF THE COLLECTION

The material is presented as shown in the List of Contents. Additional explanatory notes, information and cross-references are appended where appropriate to the separate sections and the individual entries.

The surviving documentation of many aspects of Benjamin's career, is unfortunately sparse; several of his career moves seem to have resulted in the loss or destruction of papers.

Section A, Biographical, provides a useful outline of the principal events of Benjamin's life including his appointment to the Sedleian Professorship at Oxford. His non-professional interests, music and poetry, are well recorded, with examples of Benjamin's own scores and writings on music, and poems, almost all written in 1980.

Section B, Notes, drafts and calculations, is the largest in the collection. It includes material relating to university courses taught by Benjamin and a considerable quantity of notes and other material relating to research, publications and lectures, much of it undated and difficult to assign as to category.

Section C, Lectures, conferences and visits, is far from being a complete record of Benjamin's travel and conference commitments, although something of the extent of his travels and his reputation as a lecturer can be seen. It covers the years 1970-1994.

Section D, Societies and organisations, is slight and does not convey the full involvement of Benjamin in the life of professional mathematical societies, or of his contribution to the publication of learned journals (he was a founder editor of the influential *Journal of Fluid Mechanics*).

Section E, Mathematics and higher education, records Benjamin's concern with various aspects of higher education, especially the National Conference of University Professors of which he was a founder and first Chairman.

Section F, Correspondence, is slight.

There is also an index of correspondents.

ACKNOWLEDGEMENTS

We are pleased to acknowledge the help of Mrs Natalia Benjamin and Professor John Toland in making the papers available and in helping to date and identify some of the documents and photographs.

Jeannine Alton
Timothy E. Powell
BATH 1997

SECTION A

BIOGRAPHICAL

A.1-A.61

A.1-A.25

CAREER, HONOURS AND AWARDS

A.26-A.32

MUSIC

A.33-A.55

POETRY

A.56-A.61

PHOTOGRAPHS

Biographical

CAREER, HONOURS AND AWARDS

- A.1 Miscellaneous curricula vitae and biographical information, compiled at various dates. Includes 'main accomplishments over last three years' (1989-1992), listing recent significant honours and publications.
- List of publications to 1993.
- References to publications in the form *Bibliog.* ... refer to this list.
-
- A.2 Obituary notices and tributes:
- The Times*
- The Independent*
- The Daily Telegraph*
- The Guardian*
- King's College Cambridge *Annual Report*
- The Queen's College Oxford *Record*
- Service of Thanksgiving 27 January 1996; Order of service, addresses by D.G. Crighton, T. Mullin, J.F. Toland.
-
- A.3 University of Liverpool, October 1947-July 1950.
- Record of courses attended.
- Press cuttings.
- Letter from unidentified University friend, mainly about music, written shortly before Benjamin's departure for America.
- See A.30 for Benjamin's musical activities at Liverpool.
-
- A.4 Yale University, Dunham Laboratory, 1950-1952.
- Benjamin spent 1950-1952 as a Rotary Foundation Fellow, obtaining an M.Eng. for work on the effects of ultrasonic frequencies on cavitation in liquids.
- Manuscript 'Progress Report of Research Work by B. Benjamin during session 1950-1951', press cuttings.

Biographical

- A.5 Award of William Hopkins Prize of the Cambridge Philosophical Society 1969 'for outstanding work on the mechanics of fluids'.

Notification, letter of congratulation.

See A.31 for Benjamin's musical activities at Cambridge.
- A.6, A.7 University of Essex, 1970-1978.

Benjamin was Professor of Mathematics at Essex 1970-1978, where he set up and directed the Fluid Mechanics Research Institute.

In 1974 there was a period of serious student unrest at the University.
- A.6 Press cuttings on Benjamin and on research grants for Fluid Mechanics Research Institute 1971.

List of visiting professors and seminars at Institute, 1974-1975.

List of 91 research reports published by Institute, 1971-1977.
- A.7 Press cuttings on student unrest at Essex, including letters to the press, interviews etc by Benjamin; brief correspondence, 1974.

See A.32 for Benjamin's musical activities at Essex.
- A.8 Not used.
- A.9-A.18 Sedleian Professorship of Natural Philosophy Oxford.
- A.9 Benjamin's application for the Chair November 1977, his acceptance of it February 1978, formal acknowledgement of his resignation from Essex February 1978.
- A.10 Correspondence with references.
- A.11-A.15 Letters of congratulation on the Sedleian Chair.
- A.11 A-C.

Biographical

- A.12 D-G.
- A.13 H-Mc.
- A.14 M-R.
- A.15 S-W and unidentified.
- A.16 Correspondence and papers about Science Research Council grant to Benjamin for 'Studies of hydrodynamic bifurcation phenomena' at Mathematical Institute Oxford. Includes correspondence with T. Mullin who came to work on the project as a post-doctoral researcher and became a long-term collaborator.
- A.17 Miscellaneous teaching, seminar and lecture schedules 1981-1982.
Undergraduate report on Benjamin's lecture course, nd.
- A.18 Distinction award, 1994.

Letter on proposed collaboration between Meteorological Office and Oxford University, 1994.
- A.19 Offer of Visiting Professorship, Mathematics Research Center, University of Wisconsin-Madison, 1980.
- A.19A Draft of application to Science and Engineering Research Council for further grant for research on 'Combined mathematical and experimental research on nonlinear systems', ca.1987.

Biographical

MUSIC

Benjamin was involved with music throughout his life. As an undergraduate at Liverpool he played a major part in the university's Music Society as violin player, orchestral conductor and choir-master, manager and chairman, and as a composer. He wrote light-hearted music for reviews, pantomimes and performances by 'Pantopera', and more serious works which were regularly performed and attracted favourable critical comment. The university string orchestra, which he founded, performed widely in Liverpool and outside.

At this time, when musical talent at Liverpool was unusually strong - John Shirley-Quirk, Michael Moores and Patricia Routledge were among contemporaries - Benjamin was almost drawn to a full-time career in music. Having decided in favour of science, he kept music firmly in second place at Cambridge, but at Essex he again played an important part in the orchestral and choral concerts of the University Music Society.

Scores and writings on music are at A.26-A.29. The remainder of the material bears witness to his activities through critical comment and printed notices.

- A.26 String Quartet 1948. Photocopied manuscript score.
- A.27 'Comedy Overture' 1953. Photocopied manuscript score.
- A.28 'The Progresse of The Soule'. Extracts from English metaphysical poets, typescripts with manuscript indication of possible musical settings, nd.
- A.29 Manuscript paper, probably for reading to a society, on the history of musical composition and patronage, nd.
- A.30 Music at Liverpool. Programmes, press comments, publicity, announcements, various dates 1948-1951.
- A.31 Music at Cambridge, 1954, 1956.
- A.32 Music at Essex 1972. Includes letter of congratulation from Vice-Chancellor.

Biographical

POETRY

Poems written almost entirely in 1980. Indexed by Benjamin's title.

- A.33 'A saying to my liking'. Manuscript and typescript versions.
- A.34 'Encounter'. Manuscript and typescript versions, the latter with an explanatory note.
- A.35 'First thoughts'. Manuscript.
- A.36 'Four from which Childe Roland went' (on Essex University). Typescript.
- A.37 'Gulls in fields' *and* 'The mooring cord'. Typescript.
- A.38 'Haiku on science'. Heavily corrected manuscript draft, typescript version with an explanatory note.
- A.39 'Homage'. Manuscript with corrections, typescript with an explanatory note.
- A.40 'In Warsaw'. Manuscript sketch, typescript.
- A.41 'K.529, Act I'. Manuscript, typescript with an explanatory note.
- A.42 'Lesson'. Typescript.
- A.43 'Le monde ancien presque oublié' (in French). Manuscript.
- A.44 'The mooring cord' *and* untitled. Typescript.

Biographical

- A.45 'The neutron beam'. Manuscript sketches.
- A.46 'Nightmare'. Manuscript, typescript with an explanatory note.
- A.47 'The old railway'. Manuscript and typescript sketches.
- A.48 'Rayleigh'. Manuscript with corrections and an explanatory note.
- A.49 'Reflection'. Manuscript and typescript versions.
- A.50 'Sleeping baby'. Manuscript and typescript versions.
- A.51 'Soliloquy'. Manuscript.
- A.52 'Sonic boom'. Manuscript and two typescript versions.
- A.53 'Students 1975'. Multiple manuscript and typescript drafts.
- A.54 'The worry worm'. Manuscript and typescript versions.
- A.55 Sketches and drafts.

Biographical

PHOTOGRAPHS

These are all copies made available by Mrs Benjamin.

- A.56 Conducting at Liverpool, ca. 1950.
- A.57 West Freedom Railway, Wisconsin, 1980.
- A.58 Lecturing at Florida, ca. 1991.
- A.59 Third Anniversary of the founding of the National Conference of University Professors, 1992.
- A.60 With his daughter Victoria, 1992.
- A.61 On election as Associé Etranger, French Academy of Sciences, 1993.

SECTION B

NOTES, DRAFTS AND CALCULATIONS

B.1-B.165

The papers in this section were received via Professor John Toland, University of Bath, in 1996. It includes material for research, lecture notes and drafts for publications but it has not always been possible to distinguish between these categories.

B.1-B.17

UNIVERSITY TEACHING

B.18-B.165

OTHER NOTES, DRAFTS AND CALCULATIONS

B.18-B.143 Shorter notes, drafts, calculations

B.144-B.156 Incomplete longer drafts

B.157-B.164 Miscellaneous

B.165 Notebook

Notes, drafts and calculations

UNIVERSITY TEACHING

Material relating to university courses on identified topics. Further teaching material which cannot be so clearly assigned is to be found in Other notes, drafts and calculations (B.18-B.168).

- B.1 Applications of D[ifferential] E[quation]s.
Typescript problem sheet 2 for 'MODS, Trinity Term'; manuscript lecture notes paginated 1-25 with 3pp notes on 'Parametric excitation'.
- B.2-B.4 'B5 Notes'. Contents of Benjamin's folder so inscribed divided into four for ease of reference: manuscript notes *re* course on Applied and Numerical Analysis.
- B.2 Review of course; work sheets; 'material not used 1994'.
- B.3, B.4 Lecture notes, paginated 1-65. 2 folders.
- B.5 Applied Functional Analysis.
Typescript class papers and manuscript lecture notes; manuscript draft examination question on 'Topics in Analysis'.
- B.6, B.7 'M.Sc. course (8 lectures Mich. Term)'. Contents of Benjamin's folder so inscribed divided into two for ease of reference: manuscript notes for lectures on PDEs, paginated 1-22.
- B.8 Manuscript notes and transparencies; letter from B.D. Sleeman *re* Benjamin's participation in IMA Symposium, 8 May 1980.
- B.9 Photocopied manuscript Pure Maths test sheets, Spring 1975.
- B.10 Manuscript Theoretical Mechanics work sheets. Nd.

Notes, drafts and calculations

- B.11, B.12 Contents of Benjamin's folder divided into two for ease of reference.
- B.11 Manuscript and typescript worksheets.
- B.12 Manuscript lecture notes paginated 1-38.
- B.13-B.17 M.Sc. course on Waves and Compressible Flow.
- B.13 Manuscript lecture notes, paginated 1-20, with later annotations 1988, 1989, 1990; manuscript draft exam question.
- B.14 Miscellaneous pages of manuscript lecture notes.
- B.15 Manuscript and typescript class papers 1, 2, various versions.
- B.16 Manuscript and typescript class papers 3-5, various versions.
- B.17 Manuscript and typescript class papers 6-8, various versions.

OTHER NOTES, DRAFTS AND CALCULATIONS

Presented in a single sequence arranged as far as possible by subject. Some of the material was found in Benjamin's own folders and envelopes, sometimes with an indication of the subject of the material inscribed thereon, but the bulk of the papers were found loose and unordered. The papers include drafts of publications and lectures, teaching material, research notes and calculations and transparencies for illustrating lectures. The bulk of the material is undated.

Where applicable reference has been made to the bibliography at A.1 in the form *Bibliog.* ...

Notes, drafts and calculations

- B.18 'Air lubrication of tape'.
Manuscript draft paginated 1-13.
- B.19 'Asymptotics of new solitary wave'.
Incomplete manuscript calculation paginated 1-6.

'More about asymptotics'.
Manuscript calculation paginated 1-4.
- B.20 Manuscript draft beginning '4. Estimates for axisymmetric steady motions'
paginated 1-5, latest bibliographical reference 1974.
- B.21 'Generalized BBM equation'.

Photocopied manuscript calculation paginated 1-11, latest bibliographical
reference 1987.
- B.22 'BICC wire-unwinding problem'.

6pp photocopied typescript by D.C.Handscomb, 26 February 1981.
- B.23 Manuscript notes and transparencies for lecture on bifurcation theory.

See also C.10
- B.24 'R.R. Huilgol Théor. Méc. Univ Paris VI Multi-parameter Bifu Probs ~ 15
June at Bath Slides 1-5'. Contents of envelope so inscribed.

Transparencies for lecture.

See also C.10.

Notes, drafts and calculations

- B.25 'Notes about Boussinesq system'.
Manuscript draft paginated 1-3 20 February 1995.

'Operator needed in modified Boussinesq system'.
Manuscript calculation paginated 1-3.
- B.26 'Chaotic bubbles'. Contents of Benjamin's envelope so inscribed.
Transparencies and figures for lecture.
- B.27 'Free vibrations of bubbles'.
Manuscript draft paginated 1-9, latest bibliographical reference 1964.
- B.28, B.29 'Capillary problem'. Contents of Benjamin's folder so inscribed.

Incomplete manuscript draft of 'Liquid drops suspended by soap films. Part 1. General formulation and the case of axial symmetry' by Benjamin and A.D. Cocker, 1983. *Bibliog.* 60.
- B.28 Summary, Introduction, '2. Equations of equilibrium' paginated 1-8.
- B.29 '4. Axisymmetric drop' and conclusion paginated 1-13, list of references; graphs and data provided by colleague in March and April 1983.
- B.30 'Nonlinear capillary problem'. Contents of Benjamin's envelope so inscribed.
Manuscript calculations.
- B.31, B.32 'Cones Uniqueness'. Contents of Benjamin's folder so inscribed divided into two for ease of reference.

Manuscript notes and calculations.

Notes, drafts and calculations

- B.33 'Contraction mapping principle'.

Photocopied manuscript calculations paginated 1-8 (lacks p7), with typescript question on the contraction mapping principle.
- B.34 'The contraction ratio for a sluice-gate on whose vertical parts the fluid velocity is zero'.

Manuscript calculation.
- B.35 'New aspects of unsteady Couette flow'.

Typescript draft paginated 1-11 ca.1980, and manuscript notes, figures etc found therewith. *Bibliog.* 55.

See also C.13.
- B.36, B.37 'Slides: Degree th[eor]y.' Contents of Benjamin's envelope so inscribed divided into two for ease of reference.
- B.36 Letter from W.G. Pritchard, 31 October 1989 enclosing photographs of film thickness during experiments; set of 16 transparencies, latest bibliographical reference 1980.
- B.37 Miscellaneous transparencies.
- B.38-B.40 'Discontinuities'. Contents of Benjamin's envelope so inscribed divided into three for ease of reference.

Manuscript drafts, latest bibliographical reference 1986.
- B.41 Energy demand in the United Kingdom.

Manuscript note paginated 1-4, latest reference 1972.
- B.42 'Outline of existence theory'.

Manuscript calculation paginated 1-4.

Notes, drafts and calculations

- B.43 Manuscript draft beginning '[...] My own interest in f.a. is essentially pragmatic'.

Conference lecture on 'nonlinear positive operators ("positone" problems)' paginated 1-6.
- B.44 Flows.

Manuscript notes and transparencies for conference lecture on 'what happens in various flow situations where nonlinear effects are delicately balanced'.
- B.45 'Gas dynamics'.

Manuscript calculation paginated 1-5.
- B.46, B.47 'Gravity current in Strat. fluids'. Contents of Benjamin's folder so inscribed divided into two for ease of reference.

Manuscript calculations.
- B.48 'Gravity currents'. Contents of Benjamin's envelope so inscribed.

Letter from M. McIntyre to H. Huppert *re* lecture by Benjamin, 9 May 1988; set of 12 transparencies.
- B.49 'Hamiltonian Structure'.

Manuscript calculation paginated 1-3.
- B.50-B.53 'Stability of Hill vortex'. Contents of Benjamin's folder so inscribed divided into four for ease of reference.
- B.50 'The alliance of practical and analytical insights into the nonlinear problems of fluid mechanics' by Benjamin, University of Essex Fluid Mechanics Research Institute Report no.67 September 1975. Bound volume with manuscript notes and calculations intercalated.
- B.51-B.53 Miscellaneous manuscript notes and calculations. 3 folders.

Notes, drafts and calculations

- B.54 'Some recent work on the Hodgkin-Huxley nerve equations'.
6pp photocopied typescript draft.
- B.55 Manuscript draft beginning 'Appendix. A formulation of the complete hydrodynamic problem' paginated 1-6, latest bibliographical reference 1987.

Manuscript draft beginning 'Appendix: Formulation of hydrodynamic problem' paginated 1-3.
- B.56 Contents of Benjamin's folder: manuscript notes, figures and transparencies for lectures on hydrodynamic stability, 1980s.
- B.57 'Generalization of results for ILW eqn'.
Manuscript draft paginated 1-10, September 1994.
- B.58 'Proof that periodic steady solns of the ILW eqn are parameterized in exactly the same way as those of KdV eqn'.
Manuscript draft paginated 1-8, September 1994.
- B.59 'Simple theory of instability'.
Photocopied manuscript notes paginated 1-4.
- B.60, B.61 Incomplete manuscript draft on 'Internal waves' paginated 35-76. Latest bibliographical reference 1967. 2 folders. Possibly related to *Bibliog.* 29.
- B.62 'K & de V eqn'. Contents of Benjamin's folder so inscribed.
Manuscript calculations, some on verso of 1965 duplicated typescript course sheets.

Notes, drafts and calculations

- B.63 'Generalized KdV equation'.
Manuscript draft paginated 1-24, latest bibliographical reference 1987.
- B.64 'Slides Lecture on gen[eralize]d KdV eqn Hull 13/5/93'. Contents of Benjamin's envelope so inscribed.
Transparencies.
- B.65 'Kelvin - Arnol'd'.
Manuscript calculation paginated 1-13, with later addition. Latest bibliographical reference 1967.
- B.66-B.68 'Reappraisal of the Kelvin-Helmholtz problem'. Part 1. Hamiltonian Structure' by Benjamin and T.J. Bridges. *Bibliog.* 74.
Manuscript draft for publication. 3 folders.
- B.69 'Applications of Leray-Schauder degree theory to problems of hydrodynamic stability'. *Bibliog.* 41.
Manuscript draft paginated 1-21.
- B.70 Navier-Stokes problems.
Transparencies.
- B.71 'Some qualitative properties of Nagumo's Nerve Axon Equation'.
13pp typescript draft by M. Green, ca.1972, with covering letter inviting Benjamin to comment and to add his name to the paper; manuscript note by Benjamin on 'Nagumo's equation' paginated 1-8.
- B.72 'Necessity of upstream influence ahead of cavity in swirling flow, when angular velocity is not uniform'
Photocopied manuscript draft paginated 1-8, 23 July 1973.

Notes, drafts and calculations

- B.73 Incomplete manuscript draft beginning 'Chapter 3. Nonlinear dispersive systems with one space variable' paginated 1-31 (lacks pp7-11), latest bibliographical reference 1984.
- B.74 Lecture to Faculty of Mathematics, Cambridge University, on non-linear equations.

Manuscript draft paginated 1-10.

See also C.12.
- B.75 Contents of Benjamin's folder: manuscript notes and transparencies on work with P. Olver. Possibly related to *Bibliog.* 56.
- B.76 'New approach to 1-D nonlinear hyperbolic systems'.

Manuscript calculation.
- B.77, B.78 'Planar motions of a perfect fluid'. Contents of Benjamin's envelope so inscribed divided into two for ease of reference: manuscript drafts, latest bibliographical reference 1977.
- B.77 'Introduction' paginated 1-13 (lacks p3); two different drafts of '2. General Theory' paginated 1-4 and 1-5.
- B.78 '3. Planar motions' paginated 1-16; '3.5 Confined flows with disconnected sets of S' paginated 1-5; photocopied manuscript calculation paginated 1-6.
- B.79 'Positive-operator theory'.

Manuscript draft paginated 1-10; manuscript ?appendix 'Existence Th[eore]m' paginated i-iii.
- B.80 Manuscript 'Notes' chiefly on R_0 paginated 1-8.

Probably Benjamin's comments on draft sent to him to referee.

Notes, drafts and calculations

- B.81 'Lecture on rimming flows'. Contents of Benjamin's envelope so inscribed.
Typescript draft paginated 1-12, latest bibliographical reference 1988; transparencies.
- B.82 Manuscript drafts on rimming flows, September 1989.
'Thin rimming flows' paginated 1-9; 'Second-order approximation for rimming flows' paginated 1-7; 'Notes on stability of thin rimming flows' paginated 1-6.
- B.83 Miscellaneous manuscript calculations and notes found with preceding.
- B.84 'Spherical vortex'.
Manuscript calculation.
- B.85 'The solitary wave with surface tension'. *Bibliog.* 58.
Manuscript draft for publication paginated 1-13 + references.
See also C.17.
- B.86 Incomplete manuscript draft beginning '6. Conclusion. The topological method of analysis expounded in section 2 has been applied to three specific solitary wave problems' by Benjamin, J. L. Bona and D. K. Bose, paginated 1-8, latest bibliographical reference 1981. Possibly related to *Bibliog.* 73.
- B.87-B.89 Incomplete manuscript draft on solitary waves paginated 11-77. Latest bibliographical reference 1987.
- B.87 '2. Properties relating to solitary-wave solutions'; '3. Stability'.
- B.88 '4. Instability'.
- B.89 '5. Generalized BBM solitary waves', '6. Conclusion'.

Notes, drafts and calculations

- B.90 'Proper "regularization" of solitary-wave equation'.
Manuscript calculation paginated 1-3, 8 September 1993.

'Integrals of generalised equations with periodic and solitary-wave solutions'.
Manuscript draft paginated 1-8, September 1994.
- B.91 'Surface solitary waves: outline of theory'.
Manuscript draft paginated 1-24.
- B.92 'Notes on solitary-wave problem'.
Manuscript draft paginated 1-14.
- B.93 Contents of Benjamin's envelope.
Manuscript notes and transparencies on solitary waves.
- B.94 Contents of Benjamin's envelope.

Transparencies on stability of solitary waves, latest bibliographical reference 1987.
- B.95 Solitary waves.

Transparencies.
- B.96 Manuscript list of 'Conférences par T.B. Benjamin' on stability and related mathematical problems; manuscript draft beginning 'Maintenant pour ma première conférence, je voudrais introduire plusieurs idées et définitions fondamentales', paginated 1-13.
- B.97, B.98 'Stability'. Contents of Benjamin's folder so inscribed divided into two for ease of reference.

Notes, drafts and calculations

- B.97 Manuscript 'Proposed outline for the sequel to BBM' paginated 1-5; photocopied manuscript 'Notes on [Chapter] 5', paginated 1-10.

 In two different hands, neither Benjamin's.
- B.98 Miscellaneous manuscript calculations.
- B.99 'Stability of kinematic waves (general, approximate theory)'.

 Manuscript calculation paginated 1-4.
- B.100 Incomplete manuscript draft beginning '3. The effect of surface tension on stability' paginated 10-16.
- B.101 'Existence d'autres solutions stationnaires dans le cas où λ_1 est négative'.

 Manuscript drafts in French.
- B.102 'Stationary waves on a running stream'.

 Manuscript draft paginated 1-24.
- B.103, B.104 'Steady flows drawn from a steady stratified reservoir'. Possibly related to *Bibliog. 52*.
- B.103 Manuscript draft for publication paginated 1-46, latest bibliographical reference 1969.
- B.104 Notes and pages of drafts found therewith.
- B.105 Manuscript notes and figures for lecture on steady flows paginated 1-16.
- B.106 Contents of Benjamin's envelope: manuscript outline of two lectures on steady flow; transparencies.

Notes, drafts and calculations

- B.107 Incomplete manuscript draft beginning '3.3 Existence and regularity of stable steady flow' paginated 17-24, latest bibliographical reference 1964.
- B.108 'Steady flows of ideal fluid in rectangular channel'.
Manuscript draft paginated 1-7.
- B.109 Manuscript draft beginning 'My object today is to show you what can be done to solve the exact equations of steady motion for stratified fluids' paginated 1-8, latest bibliographical reference 1963.
- B.110 'Complete theory of steady waves in a two-fluid solution'.
Manuscript draft paginated 1-28, September 1994.
- B.111 'Steady wave solutions of generalized KdV and BBM equations and systems, including case of non-local operators'.
Manuscript draft paginated 1-13, September 1994.
- B.112 Manuscript draft of Benjamin's contribution to Festschrift for M.J. Lighthill on his Sixtieth birthday (1984) beginning '[...] We had independently noticed several facts that classified the theory of steady long waves in a horizontal water channel', paginated 1-20.
- B.113 'Notes on the multiplicity of flows in the Taylor experiment'. *Bibliog.* 57.
Manuscript draft for publication by Benjamin and T. Mullin paginated 1-15.
- B.114 Manuscript calculation on 'events observed in the Taylor experiment' paginated 1-8.

Incomplete manuscript draft beginning 'The purpose of this paper is to review the mathematical problem posed by realistic models for Taylor's famous experiment'. Latest bibliographical reference 1978.

Notes, drafts and calculations

- B.115 Manuscript draft beginning 'Outline of theoretical issues' on 'high multiplicity in the Taylor experiment' paginated 16-30, latest bibliographical reference 1981, and pages of drafts found therewith.
- B.116 'Thin films'.

Manuscript draft and transparencies for lecture at unidentified 'international center of mathematical research'.
- B.117 'Tensors'.

Manuscript notes paginated [1]-18.
- B.118-B.120 'Transitions in parallel flows'. Contents of Benjamin's folder so inscribed divided into three for ease of reference.
- B.118 Includes letter to Benjamin from Marten Landahl *re* alterations to draft paper, 21 February 1962, manuscript draft by Landahl, 20 March 1962, manuscript draft titled 'Possible title: Progress Report on theoretical studies concerning Boundary Layers over compliant surfaces', paginated 1-3.
- B.119, B.120 Manuscript notes and drafts. 2 folders.
- B.121 Manuscript draft beginning 'Turbulence is still a mysterious subject', paginated 1-3; transparencies found therewith.
- B.122 'Two-dimensional flows'.

Photocopied manuscript notes paginated 7-10 and figures found therewith.
- B.123 Manuscript draft beginning '[...] some elementary but important considerations regarding 2-D flows' paginated 1-7.
- B.124 Manuscript draft beginning 'In this comparatively simple case of two-dimensional motions' paginated 1-7, latest bibliographical reference 1984.

Notes, drafts and calculations

- B.125 'Unsteady wave motions of small but FINITE amplitude'.
Manuscript draft paginated 6-10, latest bibliographical reference 1967.
- B.126 'Cellular flows of a viscous liquid that partly fills a horizontal rotating cylinder', by Benjamin and S.K. Pathak. *Bibliog.* 68.
Incomplete manuscript draft for publication.
See B.127, B.128.
- B.127 'Benjamin & Pathak "Cellular flows of a viscous liquid that partly fills a horizontal rotating cylinder" [...]'.
Transparencies and figures for lecture.
See B.126, B.128.
- B.128 'Pathak paper'. Contents of Benjamin's folder so inscribed.
Transparencies.
See B.126, B.127.
- B.129, B.130 Contents of Benjamin's folder divided into two for ease of reference.
- B.129 'Notes on the problem of buckling instability in sheets and columns of highly viscous liquid' by Benjamin, 24pp photocopied manuscript, November 1967.
- B.130 Manuscript notes and calculations on viscosity.
- B.131 Manuscript draft of lecture on viscous fluid in a stationary solution, Grenoble, France (in French) paginated 1-23.
- B.132, B.133 'Visc. sheet'. Contents of Benjamin's folder so inscribed divided into two for ease of reference.
Manuscript calculations.

Notes, drafts and calculations

- B.134 'Viscous flow down inclined plane'.
Manuscript calculation paginated 1-12.
- B.135, B.136 'Vortex stab.' Contents of Benjamin's envelope so inscribed divided into two
for ease of reference.
Manuscript notes and calculations.
- B.137 'Notes on water-wave theory (Part II)'.
Manuscript notes for lecture in autumn course on mathematical and
numerical methods in fluid dynamics, International Centre for Theoretical
Physics, Trieste, 17 September - 15 December 1973. Paginated 1-22.
- B.138 'Water waves'. Contents of Benjamin's envelope so inscribed.
Manuscript notes paginated 1-8, latest bibliographical reference 1984;
transparencies.
- B.139, B.140 Contents of Benjamin's envelope divided into two for ease of reference.
Manuscript introduction and set of 19 transparencies for lecture on
mathematical theory of water waves.
- B.141 'Variational principle for steady water waves'.
Manuscript draft paginated 1-8.
- B.142 'Waves of finite amplitude in film'.
Manuscript draft for lecture paginated 1-15; manuscript notes.
- B.143 '1973 Waves in strat. fluids'. Contents of Benjamin's folder so inscribed.
Manuscript calculations.

Notes, drafts and calculations

Incomplete longer drafts

- B.144-B.146 Manuscript draft for lectures, latest bibliographical reference 1984.
- B.144 Beginning 'Shallow-water theory' paginated 1-23.
- B.145 Beginning 'KdV theory' paginated 30-40.
- B.146 Beginning 'Planar (2-D) motions' paginated 52-86.
- B.147-B.151 Lectures material. Contents of Benjamin's set of envelopes.
The inscriptions on the envelopes are reproduced in the catalogue entries.
- B.147 'Lecture 1'. Manuscript draft paginated 1-8; transparencies
- B.148 'Lecture 2'. Transparencies.
- B.149 'B[enjamin]-O[no] Eqn 4'. Manuscript draft paginated 1-7; transparencies.
- B.150 'Water Waves 5'. Transparencies.
- B.151 'Inviscid FM & Planetary waves 7'. Manuscript calculations; transparencies.
- B.152-B.156 Manuscript drafts ?for lecture series.
- B.152 '1. General theory' paginated 1-26, latest bibliographical reference 1974.
- B.153 '2. Systems of differential equations with one space variable' paginated 1-27,
latest bibliographical reference 1982.

Notes, drafts and calculations

- B.154 '4. Systems with several space variables' paginated 1-17, latest bibliographical reference 1976.
- B.155 '5. Surface solitary waves' paginated 1-26, latest bibliographical reference 1981.
- B.156 '6. Water waves' paginated 1-42, latest bibliographical reference 1983.

Miscellaneous

- B.157-B.160 Miscellaneous sets of manuscript calculations. 4 folders.
- B.161, B.162 Miscellaneous manuscript sections of drafts. 2 folders.
- B.163 Data and graphs, some sent to Benjamin by unidentified colleague.
- B.164 Two photographs of ?flow in normal and abnormal cells.

Notebook

- B.165 Hardback notebook used for data and calculations 16 November 1978 - 21 January 1979, paginated 1-126.

SECTION C

LECTURES, VISITS AND CONFERENCES

C.1 - C.41

Benjamin lectured and travelled widely, and was visiting professor for varying periods at many universities, particularly in America. He attended numerous conferences, several of which he helped to organise.

The documentation for these activities is unfortunately very sparse and may survive only in the form of brief correspondence, or the notification of a meeting or lecture. The material below, listed in chronological order, nevertheless gives some idea of this aspect of Benjamin's career. It covers the years 1970 - 1994.

Where applicable reference has been made to the bibliography at A.1 in the form *Bibliog.* ...

A small group of notes and drafts is included at C.37 - C.41. Some of the shorter notes and drafts in Section B may refer to lecture or conference papers, and are cross-referenced when such identification may reasonably be made.

Lectures, conferences and visits

- C.1 Visit to Clarkson College of Technology, Potsdam, New York, as distinguished visiting professor, spring semester 1970.
Benjamin taught on 'Special Topics in Fluid Mechanics'.
Information only.
- C.2 Fluid Dynamics Symposium, McMaster University, Hamilton, Ontario, 25-27 August 1970.
Benjamin gave a Keynote Address on 'New ideas about waves in fluids'.
Programme only.
- C.3 McGill University Montreal Quebec, seminars in mechanics.
Special seminar by Benjamin on 'The Stability of Solitary Waves', 18 December 1970. (*Bibliog.* 34).
Notice only.
- C.4 Seventh Summer Seminar in applied mathematics, on 'Nonlinear wave motion', Clarkson College of Technology, Potsdam New York, 6-28 July 1972.
Benjamin was a principal lecturer (*Bibliog.* 38).
Announcement only.
- C.5 International Symposium in honour of the 70th birthday of Sydney Goldstein, on 'Modern developments in fluid dynamics', Haifa, Israel, 16-23 December 1973.
Benjamin spoke on 'New ideas about hydrodynamic stability'.
Programme, list of participants.
- C.6 Edinburgh Mathematical Society, 1 June 1974.
Benjamin lectured on 'Modern mathematics and mechanics'.
Notice only.

Lectures, conferences and visits

- C.7 University of Essex Association Science and Technology Section, 5 December 1975.
Benjamin spoke on 'Science and music'.
Notice only.
- C.8 Autumn course on 'Applications of Analysis to Mechanics', International Centre for Theoretical Physics, Trieste, 22 September - 10 December 1976.
Benjamin was a co-Director.
Circular letters only.
- C.9 Institute of Mathematics and its Applications, Debate, Winchester College, 14 March 1977.
Benjamin opposed the motion 'that academic scientists and mathematicians should be employed in more useful activity'.
Notice only.
- C.10 Special seminar, Université de Paris VI, Laboratoire de Mécanique Théorique, 22 April 1977.
Benjamin spoke on 'Quelques nouvelles idées concernant les phénomènes de bifurcation dans les fluides' (related to *Bibliog.* 42, 43).
Notice only.
See also B.23, B.24.
- C.11 Meeting of Conference of Professors of Applied Mathematics, University College London, 28 September 1977.
Minutes only, with contributions by Benjamin.

Lectures, conferences and visits

- C.12 Rouse Ball Lecture, Faculty of Mathematics, Cambridge, 4 May 1979.
Benjamin lectured on 'New Uses for nonlinear analysis'.
Notice only.
Possibly related to B.74.
- C.13 'New aspects of unsteady Couette flow', abstract for collaborative conference paper, 1981 (*Bibliog.* 55).
See also B.35.
- C.14 International Union of Theoretical and Applied Mechanics (IUTAM), Second Symposium on Stability in the Mechanics of Continua, Nümbrecht, Germany, 28 August - 4 September 1981.
Benjamin served on the Scientific Committee.
Brief correspondence, participants.
- C.15 Society for Industrial and Applied Mathematics (SIAM) symposium, 1982.
Benjamin spoke at the symposium on 'Methods in Non-linear Analysis' at SIAM '82.
List of speakers and symposia only.
- C.16 NATO/London Mathematical Society Advanced Study Institute on 'Systems of nonlinear partial differential equations', Oxford, 26 July - 7 August 1982.
Benjamin was on the organising committee and gave some of the lectures.
Programme, participants, information.
- C.17 'New ideas about waves in fluids'.
Manuscript for short talk, nd. but kept with paper by A.E. Green 'The solitary wave with surface tension' commenting on Benjamin's paper of the same title (*Bibliog.* 58), 1982.
See also B.85.

Lectures, conferences and visits

- C.18 International Mathematical Union General Assembly, Warsaw, August 1983 (postponed from 1982).
Information only.
- C.19 Talk to Sussex Branch, Mathematical Association, Brighton, January 1984.
Correspondence, Benjamin's manuscript notes.
- C.20 L.S.G. Kovaszny Distinguished Lecture, Houston, Texas, April 1984.
Benjamin lectured on 'Old questions and new answers in fluid dynamics'.
Notice of lecture only.
- C.21 17th IUTAM Assembly, 16th IUTAM International Congress, Lyngby, Denmark, 19-25 August 1984.
Benjamin led the Royal Society's delegation.
Information only.
- C.22 Distinguished Lecture, Houston, April 1985.
Benjamin spoke on 'A novel stability problem in hydrodynamics'.
Notice of lecture only.
- C.23 'Report of the Visiting Committee to evaluate the Department of Mathematics' (Chicago), in collaboration, March 1986.
- C.24 Invitation to present a main lecture at conference on 'Mathematical problems in fluid dynamics and plasma physics', Oberwolfach, Germany, July 1987.

Lectures, conferences and visits

- C.25 Penn State University Applied Mathematics Seminars, Fall Semester 1988.
Benjamin headed a Departmental Colloquium on 'Hydrodynamic bifurcation phenomena', 1 September, and lectured on 'Vortex breakdown', 23 September.
Programme only.
- C.26 'Nonlinear Phenomena in Fluid Mechanics', Conference in honour of Benjamin's sixtieth birthday, held at Penn State University, 13-15 April 1989.
Benjamin spoke on 'Several outstanding problems in hydrodynamics'.
Programme, lists of participants.
- C.27 Alicia Golebiewska Hermann Memorial Lecture, Stanford University, California, 28 September 1989.
Benjamin lectured on 'Vortex breakdown: a partially solved enigma'.
Notice only.
- C.28 University of Cambridge, Department of Applied Mathematics and Theoretical Physics, George Batchelor Symposium, 16 March 1990.
Benjamin spoke on 'Self-propulsion of asymmetrically vibrating bubbles'.
Programme only.
- C.29 'Albert Ellis: an appreciation', tribute by Benjamin to be read at memorial service,
Manuscript, 22 April 1990.
- C.29A North British Differential Equations Seminar, Sheffield University, 6 November 1990.
Benjamin spoke on 'Hamiltonian theory for continuous equations' and 'Stable and unstable solitary wave solutions of generalised KdV and BBM equations'.
Notice.

Lectures, conferences and visits

- C.30 NSF-CBMS Regional Conference on Nonlinear Dispersive Wave Systems, University of Central Florida, Orlando, 11-15 March 1991.
- Benjamin was Principal Speaker and gave a course of ten lectures.
- Notice, programme.
- C.31, C.32 British Applied Mathematics Colloquium (incorporating 33rd British Theoretical Mechanics Colloquium), Oxford, 9-12 April 1991.
- Benjamin was Chairman and gave the opening and closing remarks.
- C.31 Conference booklet with programme, abstracts, list of participants.
- C.32 Miscellaneous correspondence and papers, including resolution on university teaching and research adopted at colloquium and Benjamin's account of the meeting prepared for publication.
- C.33 Society for Research into Higher Education (SRHE) 1991 Annual Conference on 'Research and higher education in Europe'. Leicester, 17-19 December 1991.
- Programme, participants, abstracts.
- C.34 Canadian Applied Mathematics Society Conference on 'Wave Phenomena II: modern theory and applications', Alberta, Canada, 15-18 June 1992.
- Benjamin spoke on 'A new kind of solitary waves'.
- Information, programme.
- C.35 Royal Society Bakerian Lecture, London, 12 November 1992.
- Benjamin lectured on 'The mystery of vortex breakdown'.
- Notice only.
- C.36 Meteorological Office/Oxford University Lunch, 6 December 1994.
- List of guests only.

Lectures, conferences and visits

Lectures and notes by Benjamin.

- C.37 Manuscript note on the work of Benjamin's group at Oxford (in French), nd. 1p only.
- C.38 Manuscript note on proposed consortium to be set up by European Science Foundation (in French), nd. 1p only.
- C.39 Manuscript lecture in French, nd. 12pp.
- C.40 'Supplement' to 'Lecture by T.B. Benjamin', nd. 2pp typescript.
- C.41 1p manuscript note (poor condition) on public perception of mathematics.

SECTION D SOCIETIES AND ORGANISATIONS

D.1 - D.5

See Section E for material relating to Benjamin's involvement with the National Conference of University Professors and the organisation of higher education.

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)

1975-1978

Benjamin was a member of the Comité de Direction, Laboratoire de Mécanique Théorique, Université de Paris VI, 1975-1978.

D.1 Information and agenda for meetings.

INSTITUTE OF MATHEMATICS AND ITS APPLICATIONS

1976

Benjamin was a Vice-President 1976-1978. The President at this period was the Duke of Edinburgh.

D.2 Papers for meeting of Council at Buckingham Palace, 11 March 1976. Includes correspondence and report from Benjamin on co-operation with French mathematicians.

INTERNATIONAL SOCIETY FOR THE INTERACTION OF MECHANICS AND MATHEMATICS

1976-1982

Benjamin was a founder member, member of the organising committee, and Vice-President of this new society founded at Lecce, Italy, in May 1975.

D.3 Correspondence and papers 1976-1977, 1982, membership lists, information on new society etc.

JOINT MATHEMATICAL COUNCIL OF THE UNITED KINGDOM

1977

Benjamin was a member 1977-1978.

D.4 Minutes of meeting of Council 24 November 1977, the first attended by Benjamin.

Societies and organisations

**ROYAL SOCIETY/INSTITUTE OF MATHEMATICS AND ITS APPLICATIONS
MATHEMATICAL EDUCATION COMMITTEE**

1982

Benjamin was Chairman 1979-1985.

D.5

Minutes of meeting, brief correspondence 1982. Includes drafts of Benjamin's 'Memorandum to Members of the Royal Society/IMA Mathematical Education Committee', and of a draft report by the Committee on 'A-level mathematics: the balance of pure and applied.'

Papers by others on the subject are also included.

SECTION E

MATHEMATICS AND HIGHER EDUCATION

E.1-E.18

Much of this section (E.1-E.14) is given to the National Conference of University Professors (NCUP) of which Benjamin was a founder and first Chairman. He was active in writing for its Policy Documents, and in contributing more generally in articles and letters to the press to the discussion of current issues in educational policy such as selection, curriculum content, quality control and appraisal. Some of these appear at E.15-E.18.

E.1-E.14

NATIONAL CONFERENCE OF UNIVERSITY
PROFESSORS (NCUP)

E.15-E.18

ARTICLES AND WRITINGS

Mathematics and higher education

NATIONAL CONFERENCE OF UNIVERSITY PROFESSORS (NCUP)

The NCUP was founded in 1989. A preliminary meeting was held in March and at a more formal meeting at Manchester in December officers were elected and a constitution approved. Benjamin was the first Chairman, serving until 1992, and subsequently as a member of Council.

The NCUP was set up as a non-political independent organisation. Its aims, as set out in its brochures were: to support university professors in carrying out their responsibilities for the maintenance of academic standards; to provide a forum for discussion and a corporate voice on matters of concern to the nation's university system; to improve public perceptions about the work of universities; to act as a means of collecting and disseminating information relevant to universities.

The Conference held an Annual Assembly, commissioned policy documents for general publication on specific issues of concern and circulated newsletters and information to its members.

Benjamin was closely involved in all these activities; he wrote, or contributed to, the policy documents, made representations to ministers, conducted correspondence and wrote articles and letters to the press as NCUP Chairman. Some of these survive only as press-cuttings at E.6. Drafts for other publications or reports are at E.2-E.4.

- E.1 General information on NCUP 1989-1995. Includes circulars and newsletters, arrangements for first assembly at Manchester December 1989, press releases, constitution, annual assemblies London 1990, 1992 (includes Benjamin's last annual report on retirement as Chairman), 1995.
- E.2 Policy Document 1: 'Quality-control of Teaching Standards' (*Bibliog. 75*).
Proof with corrections by Benjamin.
- E.3 Policy Document 2: 'The Role of the Professoriate'. (*Bibliog. 77*).
Benjamin's heavily-corrected manuscript draft; proof with corrections by Benjamin.
- E.4 Policy document 4: 'Improving public opinion of universities' (*Bibliog. 81*).
Manuscript draft, title 'Public perceptions of higher education'.
See also E.18.

Mathematics and higher education

- E.5 Published versions of Policy Documents 1, 2, and 3 ('Higher education: a new framework' *Bibliog.* 79).
- E.6 Articles and letters to the press by Benjamin 1990-1992.

These are press-cuttings only. Most are written by Benjamin as Chairman NCUP, a few are in Benjamin's own right advocating two-level university courses. They include items listed as *Bibliog.* 76, 78, 80.
- E.7 Miscellaneous press-cuttings, news items and comments on NCUP 1989-1992.
- E.8-E.14 Correspondence. Includes correspondence *re* meetings with ministers, general exchanges with colleagues and circular letters to members informing them of current activities, correspondence arising from Benjamin's publications etc.
- E.8 1989.
- E.9 1990 May-July. Includes account of meeting with Minister for Higher Education.
- E.10 1990 August-December.
- E.11 1991.
- E.12 1992 January. Correspondence with R. Sheppard, on the fictional presentation of universities and academics.
- E.13 1992 February-April.
- E.14 1993. Correspondence on public image of universities.

Mathematics and higher education

ARTICLES AND WRITINGS

- E.15 'The importance of mathematics in the secondary school', nd. ca.1980.
- E.16 'The public image of mathematics', nd.
- E.17 'Advice on the composition of mathematical theses', June 1987.
- E.18 'Public perception of Higher Education', *Oxford Rev. of Education*, 19, 1993
(*Bibliog.* 84).
- A fuller version of NCUP Policy Document 4. See also E.4, E.12, E.14.

SECTION F	CORRESPONDENCE	F.1-F.20
F.1	Arnold, D. W.	1995
F.2	Bona, J. L.	1982, 1993
F.3	Bridges, T. J.	1991
F.4	Crighton, D. G.	1981
F.5	Dixon, B. On Benjamin's 1967 paper (<i>Bibliog. 27</i>) as a Citation Classic.	1989
F.5A	Dixon, H. B. F.	1986
F.6	Francis, J. Letter <i>re</i> paper by Benjamin on gravity flows, enclosing photograph of water wave. (The envelope, with a note to J.F. Toland, Benjamin's Royal Society memorialist, about the letter, has been retained).	ca.1967-1969
F.6A	Granger, R. A. On Benjamin's article for festschrift edited by Granger (published 1988, <i>Bibliog.71</i>).	1985
F.7	Herczynski, A.	1983
F.8	Hopf, E.	nd

Correspondence

- | | | |
|------|---|------------------|
| F.9 | Keller, J. J. | 1993 |
| | On Benjamin's work on vortex breakdown. | |
| F.10 | Lakshmikantham, V. | 1976 |
| | <i>Journal of Nonlinear Analysis</i> ; Benjamin was on the Board of Associate Editors. | |
| F.11 | Leibovich, S. | 1994 |
| | Photocopy of Benjamin's reply only, on a paper submitted by him to <i>J. Fluid Mechanics</i> . | |
| F.12 | Lighthill, M. J. | 1984, 1988, 1990 |
| F.13 | Mitterrand, F. | 1981 |
| | Benjamin's draft only, of his letter of congratulation on Mitterrand's election as President of France (in French). | |
| F.14 | Neale, M. C. | 1994 |
| | Benjamin's work for the Science Scholarships Committee of the Commission for the 1851 Exhibition. | |
| F.15 | Phillips, O. M. | 1988 |
| | Photocopy of Benjamin's reply only, on his paper <i>Bibliog. 72</i> . | |
| F.16 | Price, W.G. | 1992 |
| | On Benjamin's Bakerian Lecture. | |
| F.17 | Restrepo, J. | 1995 |
| | Photocopy of Benjamin's reply only, on a paper submitted by him to <i>Phil. Trans.</i> | |

Correspondence

F.18 **Sneddon, I. N.** 1983

F.19 **Wilson, J. H.** 1979

F.20 **Unidentified** 1988

Letter *re* data on shape transitions.

INDEX OF CORRESPONDENTS

ACRIVOS, Andy	A.11
ALLEN, Michael	E.14
ARNOLD, Douglas N.	F.1
ATIYAH, Sir Michael (Francis)	A.11, A.21
BARNARD, George Alfred	A.11
BATCHELOR, George Keith	A.11
BINNIE, Alfred Maurice	A.11
BLAKE, Robert Norman William, Baron	A.11
BONA, Jerry L.	F.2
BONE, Geoffrey	A.11
BRIDGES, Thomas J.	F.3
BRYSON, (James) Graeme	A.11
CRIGHTON, David George	A.11, F.4
DEERE, Malcolm	E.13
DI PRIMO, Dick	A.12
DIXON, Bernard	F.5
DIXON, Henry Berkeley Franks	F.5A
DRAZIN, Philip	A.12
EDMUNDS, David Eric	A.12
FERNANDES, John H.	A.24
FERSHT, Alan Roy	E.9
FRAENKEL, Eduard	A.12
FRANCIS, John	F.6
FRIEDLANDER, Frederick Gerard	A.12
GIBSON, Alan F.	A.12
GORDON, Manfred	A.12
GRANGER, Robert A.	F.6A
GREEN, Albert Edward	A.12
GREEN, Mike	B.71

Index of correspondents

GRIST, Edward	A.24
HERCZYNSKI, Andrzej	F.7
HOCKING, Leslie	A.13
HUNT, Julian Charles Roland	A.18
JACKSON, Robert Victor	E.8
JEFFREY, Alan	A.13
JOSEPH, Daniel J.	A.10, A.13
KELLER, Jakob J.	F.9
KINGMAN, Sir John (Frank Charles)	A.13
LAKSHMIKANTHAM, V.	F.10
LEIBOVICH, Sidney	F.11
LIGHTHILL, Sir (Michael) James	F.12
LIONS, J. L.	A.10, A.13
McINTYRE, M	B.48
McLEOD, Bryce	A.13
MAHONEY, John J.	A.14
MAIR, William Austyn	A.14
MAJOR, John	E.10
MOFFATT, Henry Keith	A.14
MOORE, Derek William	A.14
MULLIN, Tom	A.16
NEALE, Michael Cooper	F.14
NEUMANN, Peter	A.14
NEWELL, Alan C.	A.14
NOHEL, John A.	A.19
PEARSON, Anthony	A.14
PHILLIPS, Owen Martin	A.14, F.15
PRICE, Williams Geraint	F.16
PRITCHARD, W. G.	B.36

Index of correspondents

QUINLAN, Sir Michael (Edward)	C.13
RATCLIFFE, John Ashworth	A.5
RESTREPO, Juan	F.17
RILEY, Norman	A.14
RILEY, Patrick A.	E.10
SCHULLER, Thomas	E.10
SEWELL, Michael John	A.15
SHEPPARD, Richard	E.12
SLEEMAN, Brian D.	B.8
SLOMAN, Sir Albert (Edward)	A.9, A.15, A.32
SNEDDON, Ian Naismith	F.18
STEWARTSON, Keith	A.15
STUART, John Trevor	A.15
THORPE, Steven	A.15
VAN WIJNGAARDEN, I	A.10
WILSON, James Harold, Baron	F.19
WOODS, Leslie Colin	A.5, A.15
WRIGHT, John	A.15
ZORSKI, Henryk	D.3