EUROMECH
European Mechanics Society

Newsletter 9
July 1997

President's Introduction

In this Newsletter you will find details of all EUROMECH *Colloquia and Conferences organized for 1998, and of some for which approval has already been given for 1999. I hope you will agree that the* EUROMECH *Council has provided an interesting, topical and varied set of scientific themes for its programme; my own feeling is that the topics on which Colloquia have been held in the past few years have been at least as novel, interesting and varied as at any time in the past.*

We want to keep things that way, and I appeal to Members of EUROMECH *to write in with suggestions for topics for future Colloquia and with suggestions of possible Chairmen (preferably themselves!). 1998 will see a complete change of Officers. Bengt Lundberg, Ernst-August Müller and I all come to the end of our current periods of Membership of the Council, and we have all indicated that we do not wish to stand for election again, believing that the time has come for new faces. The Council at its meeting in 1997 in Liverpool decided to elect as President for 1998 Professor Hans Fernholz, as Secretary-General Dr Miroslav Okrouhlik, and as Treasurer Professor E.J. Hopfinger. All have accepted, and have obtained the agreement of their institutions to provide some measure of support for their activities.*

Hans Fernholz has been a key figure in EUROMECH *right from the beginning. He was the Secretary for* EUROMECH *Colloquium No. 1* "Boundary Layers and Jets along highly curved walls - Coanda effect", *held in Berlin in April 1965 under the Chairmanship of Professor R. Wille; he was the Secretary of the* EUROMECH *Committee (as it then was) from 1972 to 1989, Chairman of the Fluid Mechanics Conference Committee from 1995 to the present, and a Member of the* EUROMECH *Committee or Council for almost the whole of the last thirty years. In that time he has also organized several* EUROMECH *Colloquia and presented papers at innumerable others. His tenure of the Presidency will fittingly mark more than thirty years of selfless and highly effective work for* EUROMECH.

Dr Miroslav Okrouhlik is also no stranger to EUROMECH, *as he has organized one very successful Colloquium, taken part in several others, provided a uniquely informative report to the Council on a* EUROMECH *Colloquium held in Nizhny Novgorod in difficult circumstances, and has been one of the several Czech scientists who have made such vigorous efforts to develop* EUROMECH *activities in their own country and in Eastern Europe generally.*

scientists who have made such vigorous efforts to develop EUROMECH *activities in their own country and in Eastern Europe generally.*

Emil Hopfinger has been a long-standing Member of the EUROMECH *Council, and served also as a Member of the Turbulence Conference Committee and the Fluid Mechanics Conference Committee. His ready agreement to take over the Treasurership is warmly appreciated.*

I want to thank Bengt Lundberg and Ernst-August Müller for their great contributions to EUROMECH, *as Council Members and Officers; they have done very much to assure the continuing success of* EUROMECH, *now with more than 1000 members dispersed very widely throughout Europe – and indeed far beyond. We can be confident that their energies will not be entirely lost to* EUROMECH, *and can look forward to* EUROMECH *Colloquia and Conferences they will organize and take part in.*

The appointment of Professor Fernholz and Dr Okrouhlik as Officers means that there are three vacancies on the Council, for a period of six years in each case, from January 1 1998, and Members of EUROMECH *are invited to vote on the candidates listed in the voting paper enclosed with this Newsletter. These candidates have been proposed by the membership, in response to the appeal in the last Newsletter, and the Advisory Board has arranged them as shown on the paper, having regard to subject and geographical balance on the Council. The Council itself will co-opt additional Members, within the restrictions imposed by the Statutes, once the results of the election are known, in order to further improve representation of disciplines within mechanics and countries in Europe on the Council.*

Please do not fail to vote, and please be sure to send in your voting paper to the Treasurer before the deadline of September 30th.

David G. Crighton
President, EUROMECH

EUROMECH Newsletter 9
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Please copy this at A4 size and pass to any likely prospects

EUROMECH Membership Application Form

I would like to apply for membership of EUROMECH

Family name/surname:

First (given) name:

Title (Prof., Dr., etc.):

Position:

Work address:

Phone: Fax:

E-mail: Internet:

Research interests:

Names and addresses of two referees whom the Society may consult:

Signature

Please tick if you are a member of:

AIMETA ________ AUM ________ BYELOMECH ________

CCEMS ________ GAMM ________ USME ________

Please return this form to Prof. D.G.Crighton,

D.A.M.T.P , University of Cambridge, Silver Street, Cambridge CB3 9EW, UK,

e-mail: dgc@damtp.cam.ac.uk

Miscellaneous Announcements

WCCM IV

Fourth World Congress on Computational Mechanics
June 29th. to July 2nd. 1998, Buenos Aires, Argentina
Prof.Sergio Idelsohn, AMCA, Güemes 3450,
3000 Santa Fe, Argentina.
e-mail: rngtm@arcride.edu.ar
Prof. Eugenio Onate, SEMNI, Edificio C–1, Campus Norte, UPC,
Gran Capitan s/n, 08034 Barcelona, Spain
e-mail: iacm@etseccpb.upc.es

ICMAR'98

9th. International Conference on Methods of Aerophysical Research
June 29th. to July 3rd. 1998. Akademgorodok, Novosibirsk, Russia
V.Fomin & A.Kharitonov, chairmen. V.Lebiga, scientific secretary.
e-mail: lebiga@itam.nsc.ru and icmar@itam.nsc.ru
http://www.itam.nsc.ru/icmar98

DCAMM

International Graduate Research School in Applied Mechanics
Ten day courses in January and June 1998, longer visits of several months.
Pauli Pederson, co-ordinator,
Department of Solid Mechanics, Building 404,
Technical University of Denmark,
DK–2800, Lyngby, Denmark.
e-mail: dcamm@fam.dtu.dk

The Research School functions within the standard framework of the Ph/D. education at DTU. Ph.D. students at DTU associated to the School are enrolled in the Ph.D. programmes for Mathematics, Mechanical Engineering and civil Engineering. The School's role is to provide for an interdisciplinary framework for education of young researchers in an international environment.

DCAMM can offer a limited number of scholarships for visiting students.

CISM

The Intrernational Centre for Mechanical Sciences would be pleased to offer its facilities, free of charge, for EUROMECH Colloquia. Additional secretarial services and the printing and distribution of announcements, preprints and abstracts, and the use of the telephone etc. would be charged at cost.

Professor S.Kalizky,
I–33100 Udine, Italy, Palazzo del Torso, Piazza Garibaldi, 18.
e-mail: CISM@CC.UNIUD.IT

Reynolds Number Dependent Scaling vs. the Logarithmic Profile in Wall Turbulence: a Possible Resolution

G.I.Barenblatt and A.J.Chorin, University of California, Berkeley

Despite sixty years of active research in the theory of turbulent shear flow (including flow in a pipe), two conflicting "laws" for the distribution of the mean velocity u coexist in the literature (see, e.g. Schlichting, 1960). The first is the scaling law,

$$\phi = A\eta^{\alpha} \quad (1)$$

where ϕ is the dimensionless velocity, η is the dimensionless distance from the wall and A, α are constants that are known to depend slightly on the Reynolds number *Re*. The second is the "universal" Kármán-Prandtl law of the wall,

$$\phi = \frac{1}{k}\ln\eta + B \quad (2)$$

where k and B should be universal constants.

It used to be thought that the universal logarithmic profile (2) had a well-motivated theoretical derivation while the scaling law (1) was only an empirical correlation. More recently it was shown in Barenblatt (1993)that both can be derived from equally well-defined though different assumptions. The difference between the laws (1) and (2) is fundamental: according to (2) the experimental points in the $\phi - \ln\eta$ plane cluster on a single line, while if (1) holds the data lie on a family of curves paramaterised by Reynolds number, thus filling an area in that plane.

In Barenblatt (1993) and Barenblatt & Prostokishin (1993) the following specific form of the scaling law was proposed:

$$\phi = \left(\frac{1}{\sqrt{3}}\ln Re + \frac{5}{2}\right)\eta^{\left(\frac{3}{2\ln Re}\right)} \quad (3)$$

and an instructive correspondence to the data of Nikuradse (1932) was found. The family of laws (3) has an envelope, and the data published by Nikuradse happen to be very close to that envelope, so that the area-filling property of the scaling law could not be seen fully. In Barenblatt & Goldenfeld (1995) it was shown that only the logarithm of *Re* can enter the scaling law, as a consequence of the deep physical principle of asymptotic covariance.

The family of curves (3) was further analysed in Barenblatt & Chorin (1996) with the help of small viscosity asymptotics, originating from recent work on the statistical theory of turbulence which showed that the zero-viscosity limit is well-defined and that finite *Re* turbulence can be studied by expansion about the limit (Chorin, 1994). It was found that at large *Re* the curves described by (3) start near the envelope of the family, then veer off into a well-marked linear part.

The slope $\partial_{\ln\eta}\phi$ of this linear part is $(\sqrt{3}/2)e^{(3/2)} + O(1/\ln Re)$, whereas the slope of the envelope is $(\sqrt{3}/2)e + O(1/\ln^2 Re)$, i.e., the linear parts of the curves have a slope $\sqrt{e} \approx 1.65$ larger than the slope of their envelope; the envelope has a slope close to that of the generally accepted logarithmic straight line. The general structure of these curves is shown in Figure 1.

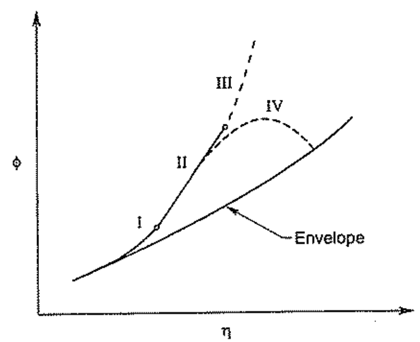

Figure 1: The individual members of the scaling law family (3) near the envelope in the $\phi - \ln\eta$ plane have a straight intermediate interval with a slope essentially larger than that of the envelope. I: a part close to the envelope; II: the straight intermediate part; III: a fast growing outer part which has no physical meaning; IV: the region near the maximum where the scaling law is not valid.

By a fortunate coincidence the paper by Zagarola *et al.* 1996 appeared recently, reporting on experimental results in pipe flow at very high pressures. High pressure leads to low kinematic viscosity, and they were able to extend the range of Reynolds number for which it is possible to measure the profile by an order of magnitude. Figure 2 exhibits the structure described above, and, indeed, with the right slopes. We view these data as an endorsement of the validity of the scaling law (1).

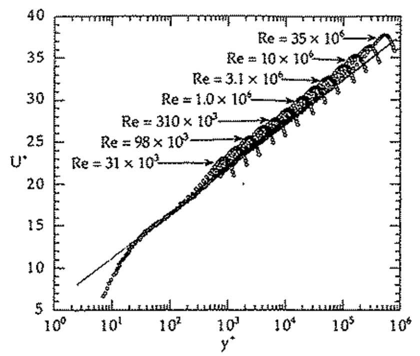

Figure 2: Velocity profiles normalised using inner scaling variables for 13 Reynolds numbers from 32 x 10^3 to 35 x 10^6. Also shown is a log-law with κ and B equal to 0.44 and 6.3 respectively. (Reproduced with permission from Zagarola *et al.*, 1996)

It should be noted that the paper by Zagarola *et al.* appeared before the paper by Barenblatt & Chorin, and that they give a very different interpretation of the results. Further data-processing should shed additional light on these issues.

Editor's Piece

Firstly, because he can not, in modesty, announce the news in his introduction, may I presume to convey members' congratulations to the President on his election as Master of Jesus College, Cambridge.

At the 1996 Council meeting in Prague, a number of suggestions were made for inclusion in the Newsletter, amongst them that, as in the last issue, we should print edited versions of Chairmens' reports. It would help if Chairmen could bear this in mind and start off their report with a suitable piece about 400 words long. This issue contains the first Colloquium calendar with Chairmen's outlines to an approximately uniform format, and to make space for this, the remaining 1995/96 Chairmen's reports have been postponed to the next Newsletter.

We would also like to see material which is not essentially concerned with the administration of EUROMECH, and the first of a hoped-for series of "Problems I wish to see solved" appeared in the last issue. In this issue we have a more conventional article. Other suggestions have included "The most important achievements in mechanics during the last ten years", "History of mechanics" and "Presentation of work at a Department or Institute". Articles in this category should ideally be from two to six pages in length, approximately 900 – 2700 words. Other suggestions of which I do not immediately see the import are "EUROMECH Rewards" and "Proposals to the EU". Perhaps those who suggested these could get a letters page started by explaining them? Some humour would be welcome, and this could come either as a relatively full piece, or as a short contribution of a few lines (there is no reason why we should not also consider serious aphorisms if sufficiently striking). Readers will have noted that to avoid breaking pieces up, I often have to leave a space of perhaps 5 or 6 lines at the foot of a page, and "fillers" would be useful.

Can I ask that whenever possible, material be sent to me in electronic form. Probably the best approach is to send it e-mail, backed up by a hard copy in the post. I have tried to be clever about it, but think that I can only receive formatted copy as an "attachment" from another Mac. So if you use the wrong sort of computer, please send it as a straight ASCII text without line-breaks.

John Finley

Errata – Newsletter 8

The telephone numbers and e-mail address for Prof. E.A.Müller should be as on page 5 of this issue. The bank sort code for the Euromech account should have been (bankleitzahl 260 500 01).
The e-mail address for ESMC-3 should be 3esmc@hallf.kth.se.

I apologise for any inconvenience caused by these errors.

Report of the Treasurer

(January 1st. to December 31st. 1996)

i) Income and Expenses

	DM:
Income	
Membership fees (Treasurer)	25,824.97
Membership fees (Regional Treasurer, UK)	347.71
Interest on the current account (Treasurer)	48.51
Interest on the deposit account (Treasurer)	1,122.03
EUROMECH Colloquia (Treasurer)	15,123.05
EUROMECH Colloquia (Regional Treasurer, UK)	2,348.37
	44,814.64
Expenses	
Bank account charges and transfer charges	207.05
Postage stamps and office supplies (Treasurer)	2,808.31
Travelling costs (Council member from an Eastern country to Council meeting)	750.00
Administrative expenses (General Secretary) (Council decision, Uppsala)	10,000.00
Bank charges, secretarial help and stamps (Regional Treasurer, Poland, 1994, 1995, 1996)	1235.05
Final balance for 2nd. European Fluid and Solid Mechanics Conferences (Warsaw and Genoa)	23,473.95
Support for Polish participants in EUROMECH Colloquia and Conferences (Regional Treasurer, Poland)	2,503.71
Into reserve	3,836.57
	44,814.64

ii) Balance sheet

Balances at January 1st., 1996	
Treasurer	52,972.25
Regional Treasurer (UK)	199.03
Regional Treasurer (Poland)	6,774.41
Transfered to reserve 1996	3,836.57
	63,782.57
Balances at December 31st., 1996	
Treasurer	57,851.50
Regional Treasurer (UK)	2,895.11
Regional Treasurer (Poland)	3,035.65
	63,782.57

The treasurer's report has been audited by Professor D.Ronneberger and approved by the Council.

Acknowledgements: The authors wish to thank Dr M.V.Zagarola for his kind permission to reproduce Figure 2. The first author also thanks the Miller Institute for Basic Research at Berkeley for its generous hospitality.

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EUROMECH MEETINGS IN 1998 AND 1999

The EUROMECH Council has overall responsibility for EUROMECH Colloquia and EUROMECH Conferences.

EUROMECH Colloquia

are informal meetings on specialized research topics. Participation is restricted to a small number of research workers actively engaged in the field of each Colloquium. The organization of each Colloquium, including the selection of participants for invitation, is entrusted to a Chairman. Proceedings are not normally published.Those who are interested in taking part in a Colloquium should write to the appropriate Chairman.

The numbers, titles, Chairmen or Cochairmen, dates and locations for each Colloquium in 1998, and preliminary information for some Colloquia in 1999, are given below.

373. *Modelling and control of adaptive mechanical structures*
Prof. U. Gabbert, Otto-von-Guericke-Universität Magdeburg, Institut für Mechanik, Universitätsplatz 2, D-39106 Magdeburg, Germany
E-mail: ulrich.gabbert@mb.uni-magdeburg.de
Prof. E. Breitbach, Braunschweig
11-13 March 1998, Magdeburg, Germany

Adaptive structures are autonomous structural systems with integrated multi-functional actuators and sensors, connected by a control system, to enable adaptation to changing environmental conditions. Recently, in many branches of engineering, adaptive structural concepts have received increasing attention. The scope of the Colloquium is to provide a forum for the discussion of recent developments in this field. The main topics are: Modelling, analysis and optimization of adaptive structures, interaction between structures and sensors/actuators, including nondestructive testing of adaptive structures, methods of control of adaptive structures, including the use of neural networks, application of adaptive structural concepts in the field of aerospace, relevant to engineers, technologists, physicists and material scientists. For recent information see:

http:/comserv.urz.unimagdeburg.de/~adames/adames.html

374. *Recent computational developments in steady and unsteady naval hydrodynamics*
Prof. M. Guilbaud, C.E.A.T., 43 rue de l'Aérodrome, F-86036 Poitiers Cédex, France
E-mail: guilbaud@univ-poitiers.fr
Dr. G. Delhommeau, Nantes
27-29 April 1998, Poitiers, France

EUROMECH Conferences

are broad in scientific scope. They comprise the EUROMECH Solid Mechanics Conference, the EUROMECH Fluid Mechanics Conference, the EUROMECH Turbulence Conference, the EUROMECH Nonlinear Dynamics Conference and the EUROMECH Mechanics of Materials Conference.They are open to all those interested and are expected to have between 150 and 600 participants. The general purpose is to provide opportunities for scientists and engineers to meet and discuss current research. The responsibility for each series of Conferences is delegated to a Standing Conference Committee. The organizational work is carried out by Local Organizing Committees (LOC). Those who are interested in taking part in one of the Conferences should write to the Chairman or Secretary of the appropriate LOC. Information about the Conferences in 1998 and one Conference in 1999 is given below.

ETC-7 *7th EUROMECH Turbulence Conference*
Prof. U. Frisch, OCA, B. P. 4229, F-06304 Nice Cédex 4, France
E-mail for scientific matters: uriel@obs-nice.fr
E-mail for administrative matters: vcheron@obs-nice.fr
Further information: http://www.obs-nice.fr/etc7
30 June - 3 July 1998, Saint-Jean Cap Ferrat, France

EMMC-2 *2nd EUROMECH Mechanics of Materials Conference*
Prof. A. Bertram, Institute of Mechanics,
Otto-von-Guericke-Universität, Universitätsplaz 2, D-39106 Magdeburg, Germany
E-mail : mecamat@mb.uni-magdeburg.de
Prof. F. Sidoroff, Lyon
http://comserv.urz.unimagdeburg.de
//~ifme/mecamat/mecamat.html
23-26 February 1998, Magdeburg, Germany

EMMC-3 *3rd EUROMECH Mechanics of Materials Conference*
Prof. E. P. Busso, Imperial College, Department of Mechanical Engineering, Exhibition Road, London SW7 2BX, UK
E-mail: e.busso@ic.ac.uk
Prof. G. Cailletaud, Paris
November - December 1998, UK

ENDC-3 *3rd EUROMECH Nonlinear Dynamics Conference*
Prof. R. Ohayon, Chaire de Mécanique, C.N.A.M., rue Conte, F-75003 Paris, France
E-mail: ohayon@cnam.cnam.fr
Prof. P. Destuynder
1999, Paris, France

390. *Instability, bifurcation and localisation in fracture of materials*

Dr. G. Rousselier, Electricité de France, Dept MTC, Site des Renardieres, F-77818 Moret-sur-Loing Cédex, France
E-mail: gilles.rousselier@der.edfgdf.fr
Dr. A. Benallal, Cachan
10-12 May 1999, Paris, France

Strain localisation can be a precursor to fracture of materials. A great amount of work has been devoted to the description of this phenomenon. Depending on the constitutive behaviour, bifurcation and/or perturbation approaches can be used. Recent advances in the field and the links between the two approaches will be discussed. The effects of damage, thermal conduction, inertia, mesh size and non-local constitutive relations can be discussed, from a theoretical and physical as well as numerical point of view.

Coupled phenomena will also be considered: diffusion, stress corrosion, chemical reactions, porous solids. Contributions may concern metallic materials, concrete, soils, polymers etc.

391. *Wind tunnel modelling of dispersion in environmental flows*

Dr. Z. Janour, Institute of Thermomechanics, Dolejskova 5, CZ- 182 00 Prague 8, Czech Republic
E-mail: janour@bivoj.it.cas.cz
Prof. A. Robins, Surrey, and Prof. M. Schatzmann, Hamburg
13-15 September 1999, Prague, the Czech Republic

A powerful source of information about the physics of all the phenomena and processes in the atmospheric boundary layer is provided by wind tunnel experiments. Experimental results are only then reliable if both the physical model and the measuring techniques used are adequate. The objective of the Colloquium is to bring together the community active in relevant experimental work and to discuss, assess and report on the state of the art in this field, define directions of future research and encourage wider collaboration between research institutions. The Colloquium will concentrate on the physical modelling of flow and dispersion in the natural environment. The topic includes flow and dispersion around buildings and structures (but excludes wind loading which is well catered for elsewhere), flow over complex terrain, etc., techniques and equipment used in their simulation and the means by which such simulations are tested and evaluated.

This colloquium will concentrate on recent developments and extensions in calculations of the hydrodynamic flows around a ship's hull, in calm water and in regular or irregular waves. The aim of the meeting will be to compare the various approaches available today and to show the more promising trends for the future. Engineers and researchers working in this domain will have the opportunity to encounter a range of varied approaches. The meeting will provide a fruitful opportunity for them to meet each other and exchange their experience of current research activities in the computation of hydrodynamic flows.

375. *Biology and technology of walking*

Prof. F. Pfeiffer, Lehrstuhl B für Mechanik, TU-München, D-80290 Munich, Germany
E-mail: Pfeiffer@lbm.mw.tu-muenchen.de
Prof. H. Cruse, Bielefeld
23-25 March 1998, Munich, Germany

Walking technologies are in rapid development, in part due to the fact that these technologies are increasingly influenced by biological findings. Nature has provided perfect models of walking kinematics and dynamics, walking control, adaptive and intelligent walking behaviour. Likewise, natural structures have evolved towards perfection. Engineers can learn from biology, which offers convincing solutions adapted to the tools of nature. Engineering also posesses a wide range of powerful design tools. An optimal combination of both approaches should result in new solutions and structures.

Scientists from both sides, biology and engineering, will be invited to discuss new findings and the possibility of transfers between the two disciplines.

376. *Waves in two-phase flows*

Prof. C. F. Delale, Department of Mechanical Engineering,Istanbul University, Avcilar Kampusu, 34850 Avcilar, Istanbul, Turkey
E-mail: gokcol@sariyer.cc.itu.edu.tr
Prof. D. G. Crighton, Cambridge
27-30 April 1998, Istanbul, Turkey

The colloquium aims to bring together working specialists and active research groups from all over Europe to discuss advances made in recent years in wave characteristics in two-phase and/or two-component flows. Contributions describing waves in bulk media as well as surface waves will be considered. Selected topics include:

Waves in two-phase dispersed flow with non-equilibrium condensation and evaporation.
Waves in bubbly fluids.
Waves in dusty gases.
Waves in films or stratified systems.

Waves in dense gases with retrograde nonlinearity.
Waves in fluidised beds.
Multidimensional waves.

Theoretical, numerical and experimental contributions are equally welcome.

377. *Stability and control of shear flows with strong temperature or density gradients*
Dr. F. Marsik, Institute of Thermomechanics, Academy of Sciences of the Czech Republic, Dolejskova 5, CZ-182 00 Praha 8, Czech Republic
E-mail: MARSIK@BIVOJ.IT.CAS.CZ
Prof. P. A. Monkewitz, Lausanne
20-22 May 1998, Prague, the Czech Republic

In the flow of high enthalpy (arc-heated) jets as applied in plasma technology (e.g. in various types of layer deposition, in high temperature chemical synthesis, etc.), in many cooling and heating processes and in technological variable density flows, the problem of hydrodynamic stability plays a decisive role.

It has been proved that the stability of jets, wall-bounded layers, etc. is affected or even controlled not only by the velocity gradient, but also by the temperature gradient and by the temperature dependence of transport properties. Instabilities of various "classical" shear layers has been investigated in great detail, but the effects of temperature gradients are not yet fully understood. They deserve a detailed discussion and exchange of expertise by researchers in this field.

378. *Nonlocal aspects in solid mechanics*
Dr. J.-F. Ganghoffer, ICSI-15, rue Starcky, BP 2478, F-68057 Mulhouse Cédex, France
E-mail: JF.Ganghoffer@univ-mulhouse.fr
Prof. A. Brillard, Mulhouse
20-22 April 1998, Mulhouse, France

The failure of classical continuum theories to predict certain phenomena exhibit ed by real materials and the progress of molecular physics have led to attempts to include the effect of the microstructure within the continuum framework. Such theories were strongly advocated by Eringen, Edelenand Kroner in the sixties, and then nearly abandoned due to their apparent lack of physical significance. Only the last few years has the non-local concept regained strong interest in the scientific community, and both continuum and micromechanically-based approaches have appeared.The aim of the Colloquium is to gather the community of scientists working within the area of non-local mechanics, including theoretical, physical, and numerical aspects. Main topics include:

Theoretical framework for non-local and higher gradient continua.
Micromorphic and micropolar media.
Analysis of localisation and bifurcation phenomena.

388. *Modelling of glass forming processes*
Dr. D. Lochegnies, L.A.M.I.H. Groupe de Recherches en Génie Mécanique, Le Mont Houy, BP 311, F-59304 Valenciennes Cédex, France
E-mail: lochegnies@univ-valenciennes.fr
Prof. J. Oudin, Valenciennes
13-15 October 1998, Valenciennes, France

The main scope of the colloquium is to survey state of the art in the development of scientific modelling of glass forming processes, even in hollow and flat glass production. Both numerical techniques and applications will be discussed. Specific topics to be addressed by the colloquium include:

Process modelling
Bulk and surfasic glass constitutive laws
Thermal aspects - including heat transfer coefficient determination
Environment (ambient air, tools, processing ...) effects
Numerical techniques and simplification
Integration for control and optimisation of glass forming
Bench marking and model validation
Residual stresses

389. *Physiological flows and flow-structure interactions*
Prof. K. Perktold, Institute of Mathematics, Technical University Graz, Steyrergaße 30/3, A-8010 Graz, Austria
E-mail: perktold@fmatdds01.tu-graz.ac.at
Prof. T. Kenner, Graz
April 1999, Graz, Austria

The meeting will form a continuation of a series of Euromech colloquia dedicated to biofluid mechanics. The emphasis will be placed on fluid dynamic effects in physiological processes and mechanisms including dynamic structure interactions. The particular goal of the meeting is to bring together scientists from theoretical, experimental, computational and clinical disciplines to discuss recent methods and results and to show new perspectives. Possible topics include:

Cardiovascular and respiratory dyamics, arterial hemodynamics and relation to disease processes, hemorheology, passive and active fluid-structure interactions, dynamics of collapsible tubes, gas mixing in airways.
Biological mass transport, diffusive and convective transport in tissues, through the blood vessel wall, multi-phase flow.
Cellular mechanics, endothelial cells and shear stress in blood flow.
Fluid in interstitial spaces and capillaries, filtration processes.

386. *Dynamics of vibro-impact systems*
Prof. V. I. Babitsky, Department of Mechanical Engineering,
Loughborough University, Loughborough, Leicestershire LE11 3TU, UK
E-mail: V.I.Babitsky@lboro.ac.uk
15-18 September 1998, Loughborough, UK

Mechanical systems with multiple impact interactions have wide applications in engineering as the most intensive sources of mechanical influence on materials, structures and processes. At the same time, vibro-impact systems are used widely for the analysis of unfavourable processes in machine dynamics, vibration protection and structural mechanics.

Analysis of vibro-impact systems leads to the investigation of mathematical models with discontinuities and reveals their behaviour as strongly nonlinear. It includes combined resonances, synchronisation and pulling, bifurcations and chaos, excitation and interaction of space-coherent structure, shock waves and solitons.

The aim of the colloquium is to exchange information about up-to-date analytical, experimental and numerical approaches to the investigation of vibro-impact systems, new tendencies in vibro-impact excitation with the use of combined drive, electronic control, ultrasonics, opportunities of vibration control and protection with smart nonlinear structures, and to bring together the efforts of research and development specialists in applications of strongly nonlinear phenonema in engineering.

387. *Surface slicks and remote sensing of air-sea interactions*
Dr. N. H. Thomas, c/o Fluid Dynamics Research Centre,
Mathematics Institute, University of Warwick, Coventry CV4 7AL, UK
E-mail: nhtFRED@AOL.com
Dr. J. C. Scott, Winfrith
6-8 April 1998, Warwick, UK

Slicks are ubiquitous features of low-wind seascapes, amply manifested in EM remotely sensed images by passive and active methods at visible, microwave and radar wavelengths. Predominantly from biogenic sources in open oceans, supplemented by anthropogenic contamination in coastal waters, they play an important role in air-sea interactions. In virtue of elasticity associated with film pressure dependence on concentration, slicks amplify viscous dissipation in the surface microlayer and can thereby effectively inhibit waves up to cm scale or so. Localised reductions in roughness as patches and streaks provide the contrast features seen in remotely sensed images whilst extended regions are of interest for their attenuation of momentum and gas exchange. Interest here focusses on image interpretation for hydrodynamic inferences, on wind-wave couplings in the presence of films, especially with nonlinear waves, and on surface constitutive formulations for nonlinear deformations and non-classical behaviour such as clathrate induction and persistence. Contributions offered on aspects such as environmental and climate implications will also be considered.

Nonlocal plasticity and non-local damage / fracture mechanics.
Internal length in physics - micromechanical aspects in geomaterials, metals and polymers.
Mathematical and computational models.
Nonlocal formulation of contact and friction problems.

379. *Aerodynamics and aeroacoustics of tracked high-speed ground transportation*
Prof. G. E. A. Meier, DLR, Bunsenstraße 10, D-37073 Göttingen, Germany
E-mail: G.E.A.Meier@dlr.de
Prof. H. Sockel, Vienna, and Prof. S. Loose, Göttingen
8-10 June 1998, Göttingen, Germany

The requirements for the next generation of high-speed trains, and the accelerating development of maglev vehicles, will demand much more understanding of aerodynamics and aero-acoustics than is required for present configurations.. The cruising speed will rise into a range where additional aerodynamic problems will occur (e.g. compressibility), and the level of aerodynamically induced acoustic emissions will grow to critical values, well above those resulting from wheel/rail noise. In particular, unsteady phenonema must be taken into account. Rapid development of measurement techniques and numerical simulations over the last decade offers new possibilities for flow field analysis of non-stationary flows. The colloquium should therefore deal with the following main topics:

Effects of non-stationary flow fields on high-speed ground transportation (e.g. vortex separation, lift and side-forces, tunnel entrance and passage effects.
Numerical and experimental simulation methods, measurement techniques and facilities for non-stationary flow field analysis (e.g. particle image velocimetry, pressure sensitive paint, non-stationary numerical codes.
The possibility of active and passive flow control forreduction of non-stationary aerodynamic loads (e.g. shaping, pasive ventilation).

380. *Laminar-turbulent transition mechanisms and prediction*
Dr. U. Ch. Dallmann, DLR, Institute of Fluid Mechanics, Bunsenstraße 10, D-37073, Göttingen, Germany|
E-mail: uwe.dallmann@dlr.de
Prof. D. S. Henningson, Stockholm, and Dr. H. Bippes, Göttingen
14-17 September 1998, Göttingen, Germany

Laminar-turbulent transition is one of the key problems in fluid dynamics. Transition prediction tools are still far from being non-empirical due to the lack of understanding of many nonlinear characteristics of the breakdown to turbulence and the boundary layers' receptivity to external disturbances such as sound or turbulence in the presence of wall-roughness, variable boundary conditions (e.g. for flow control), flow rotation, flow separation, etc. In addition, flows and flow regions with absolute and convective types of instabilities have to be distinguished. The aim of the colloquium is to bring together European research scientists actively contributing to the identification of transition mechanisms and model receptivity, instabilities, nonlinear transition scenarios and bypass-transition with the objective of transition prediction and control.

382. *Fatigue life in the gigacycle regime*
Prof. C. Bathias, Conservatoire National des Arts et Métiers, 2 rue Conté, F-75003 Paris, France
E-mail: bathias@cnam.fr
Prof. S. Stanzl-Tschegg, Vienna
29 June - 3 July 1998, Paris, France

Since Wöhler proposed the concept of the S-N curve around1850, the modelisation of the fatigue limit is given for a limited number of cycles between 10^6 and 10^7. The assumption of an horizontal asymptote after 10^7 cycles implies an infinite fatigue life criterion. That is a rough approximation. In fact, fatigue fracture can appear after one billion cycles or more.The aim of this colloquium is to discuss what is the fatigue behaviour, the fatigue damage, the predictive approaches, the effect of defects and the cyclic plasticity in the range of gigacycle fatigue. After a review of the available experimental data, a discussion of the following points of view is planned:
competition between inclusion, core and plane stress induced plasticity, numerical simulation, short crack behaviour, effect of the environment after 10^8 cycles, cumulative damage beyond 10^7 cycles, high frequency fatigue tests and applications for design.

383. *Continuation methods in fluid dynamics*
Dr. D. Henry, Laboratoire de Mécanique des Fluides et d'Acoustique, UMR CNRS 5509, Ecole Centrale de Lyon, BP 163, F-69131 Ecully, Cédex, France
E-mail: henry@mecaflu.ec-lyon.fr
Dr. H. BenHadid, Lyon, and Dr. H. Dijkstra, Utrecht
6-9 September 1998, Aussois, France

Continuation methods are an efficient tool for investigating nonlinear phenomena. An important application is in fluid dynamics, where bifurcations lead to multiple equilibria and complex temporal behavior. Only recently have these methods been applied to the large systems resulting from discretizing the exact two and three-dimensional Navier-Stokes equations. Advances in numerical linear algebra (solving matrix systems and finding eigenvalues) are crucial for this. The goal of the colloquium is to define the state of the art of continuation methods applied to fluid mechanics. Research groups will present their fluid mechanical problems,

continuation methods and physical results. The contributions of the participants will be published in a special issue of *Notes on Numerical Fluid Mechanics*, Vieweg Publications.

384. *Steady and unsteady separated flows*
Dr. P. W. Duck, Department of Mathematics, University of Manchester, Manchester
M13 9PL, UK
E-mail: euro384@ma.man.ac.uk
Prof. A. I. Ruban, Manchester
6-9 July 1998, Manchester, UK

The proposed scope and theme of the colloquium is to help bring together experimentalists, theoreticians and computationalists, to enhance the development and understanding of all aspects of steady and unsteady separated flows. It is planned that a broad range of aspects of flow separation will be addressed, including steady and unsteady flows, two and three dimensions, laminar and turbulent, small- and large-scale, incompressible and compressible, external and internal, boundary layers and shear layers, stall (including dynamic stall) and bubbles. Participants concernedwith separation involving other physical processes, including (for example), stratification, rotation, chemical reaction or magnetohydrodynamical effects will be very welcome, as will be participants involved with the application and practical aspects of the subject (including those from industrial organisations).

385. *Inelastic analysis of structures under variable loads: theory and engineering applications*
Prof. D. Weichert, Institut für Allgemeine Mechanik, RWTH-Aachen, Templergraben 64, D-52056 Aachen, Germany
E-mail: weichert@uranus.iam.rwth-aachen.de
Prof. G. Maier, Milano
8-11 September 1998, Aachen, Germany

The subject of the colloquium is the assessment of the mechanical behaviour of materials and structures under variable repeated mechanical and/or thermal loads beyond the elastic limit. Of particular interest are analyses based on a minimum of information concerning the evolution of loads. Shakedown analysis and bound evaluations are typical representatives of such methods.

The colloquium is intended to cover recent developments in experimental, theoretical, computational and practical aspects of this research area, with emphasis on shakedown theory, on techniques apt to bound history-dependent quantities of technical interest, and their applications. The focus will be on recent contributions intended to allow for advanced constituitive models, configuration changes and dynamic effects.