EUROMECH
European Mechanics Society

Newsletter 13
March 1999

President's Introduction

A rather worrying feature of our times is that the pattern of society in which much of our work is accomplished has progressively changed. It is now probably true that we would have to admit that the majority of individuals engaged on research are employed on restricted period contracts. While it is not uncommon for such a worker to be engaged relatively continuously, this can not be guaranteed. The lot of a doctoral or post-doctoral worker who wishes to remain engaged on research is not therefore a very happy one.

Our Treasurer has suggested that the Newsletter could perform a useful service both to research workers and to the various institutions wishing to employ them by providing a "hiring fair" giving notice of possible upcoming vacancies. The proposal will be discussed at the next Council meeting, in April. If you have suggestions as to how this should be managed, please pass them to a member of Council. At present it is not envisaged that the Newsletter should carry anything corresponding to the full advertisements placed (at vast expense) in the technical press, but rather provide a brief indication that a post exists and how to find out more about it. Details might, for example, be placed on the Society's web page for a modest fee.

Finally, may I rather belatedly convey my best wishes to the members of EUROMECH *for 1999. May you have a contented private life and a productive professional one.*

Hans-Hermann Fernholz
President, EUROMECH

His life has been mechanics, and it will be always. In his orderly room there are no traces of personal computers or other modern facilities. (But, to be honest, the facilities are in the room next door where Professor Batchelor's faithful secretary resides. At least that is some progress when compared with his teacher: G.I.Taylor never had a secretary.)

In his recent biography of Professor Taylor (- G.I. to friends -) Batchelor has discussed the four mechanicists who have been leading figures in this century (or at least in its first half): Taylor himself, the Hungarian/German/American Theodore von Kármán, the Dutchman Jan Burgers, and the German Ludwig Prandtl. Professor Batchelor is not the flamboyant type of scientist that von Kármán was. He is also not the somewhat authoritarian, aloof professor which Prandtl seems to have been. He differs again from his teacher, who was more of an adventurous and curious boy. Maybe he is best compared with Burgers (but what, one may wonder, is the use of comparing): a bit shy, a somewhat unapproachable person at first sight but an amiable man when one gets to know him better.

Professor Batchelor is also modest. Too modest, it seems, for a man of his reputation, but it is not false modesty in his case. When one asks him about the foundation of EUROMECH he replies that he isn't interested in the past. He is even surprised that anyone could be interested. But then one can reply by pointing at his recently finished biography of G.I. Taylor and he is prepared to dig up memories.

The past:
An interview with Professor George Batchelor

"I think the origins of EUROMECH lie in conversations which I had with Küchemann. He was employed at the Royal Aircraft Establishment in this country. And he and I met from time to time at meetings and special committees.

I do remember that the need for some European organization was recognized by Küchemann and myself and we talked about what form the European connections should take. He was from a government laboratory and he knew about the various research centres. After the war he wanted those experimental facilities - such as the wind tunnels - to be available to various people. He had contacts with all the various European laboratories and he thought that an organization like EUROMECH would be based on the use of the common facilities. I, on the other hand, was more concerned about the research centres in universities and I thought it preferable to base the new organization on representatives of the universities in Europe. My feeling was that government laboratories were a little inflexible; and some had problems with confidentiality. I thought it best to keep away from that. So Küchemann and I had somewhat different ideas about what was needed, but at the beginning this was of little importance because we had to spend our time

- effects of repeated impacts on solids and granular media
- control of vibrations by impacts
- analytical, experimental and numerical methods for the analysis of vibro-impact systems and processes
- synthesis and optimisation of vibro-impact systems
- measurements of vibro-impact processes

All the topics were well presented and actively discussed.

The success of the Colloquium and wishes of participants stimulate the organisers to arrange further meetings. The organisers are very grateful to the Faculty of Engineering of Loughborough University for financial support which contributed to the wide participation of scientists from East European countries.

The proceedings will be published by Springer-Verlag

Further details may be found on: www.lboro.ac.uk/departments/mc

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EUROMECH Colloquium 387

Surface Slicks and Remote Sensing of Air-Sea Interactions

Chairmen: Neale Thomas, Warwick and John Scott, Winfrith

The meeting took place at Coventry on April 6th.–8th., 1998. At the last minute the colloquium was forced to move from Warwick University to a commercial venue, and the organisers are very grateful to ONR/EUR and UK-DERA for making it possible to avoid levying a surcharge on preregistered delegates.

Of the 34 participants (all as named authors), 28 presented 33 papers and a 29th led the wrap-up panel session. All papers were approved on the basis of abstracts solicited in the calls for registration and were distributed to delegates on arrival. Many of the talks reported work in progress, triggering animated exchanges in the rigorously enforced 5 minute discussion period immediately following each talk - aspects of which, as much as the talks, provided a platform for end-of-day overviews. No language barriers were encountered – at least not because of delegate internationalities – though the convenor at least struggled to follow some of the more exotic details of specialist instrumentation and organic chemistry. Some of the younger researchers said they were pretty exhausted at day-end but found the experience exhilarating.

The possibility of publishing proceedings is being explored in view of expressed interest by ONR and DERA in having permanent record, as deliverable in return for their support. Meanwhile the co-Chairman will be preparing a overview scientific article for consideration by one or more of the sector journals.

The organisers' scientific conclusions of the meeting are as follows. Significant progress has been achieved from the theoretical point of view in enriching existing theories and methods by more sophisticated and more realistic material models describing various inelastic effects which may lead to structural failure. Phenomena such as material damage, fatigue, non-associated flow rules, fluid saturation of porous media and slackening of structural joints have been taken into account by several contributors in generalising limit analysis and shakedown theories and relevant "direct" (nonevolutive) analysis methods. On the computational side, we observe that the development and consolidation of methods which avoid, through suitable simplifying assumptions, time-consuming optimisation procedures and which rapidly provide practically essential information available not at all or only through cumbersome and costly procedures with the usual commercial software. A trend towards software for shakedown analysis as a kind of post-processor attached to commercial software became apparent. This relates to the objective of many participants to foster the broader and industrial applications of methods of shakedown analysis.

Besides theoretically and computationally oriented contributions, a number of pertinent papers were presented on experimental investigations. Nevertheless, systematic and well-documented experimental studies on the subject of shakedown are still rare and a need for more experimental data for the validation of theoretical and numerical methods was pointed out and motivated.

EUROMECH Colloquium 386

Dynamics of Vibro-Impact Systems

Chairman: V. I. Babitsky, Loughborough

The Colloquium was held at Loughborough University on September 15th.-18th., 1998. This was the first international meeting on this subject, continuing the traditions of the series of Russian meetings held regularly since 1963. The aim of the Colloquium was to facilitate the exchange of up-to-date information on the analysis and synthesis of vibro-impact systems as well as on new developments in excitation, control and applications of vibro-impact processes.

The Colloquium attracted 51 participants from 19 countries. They presented 39 lectures of 25 minutes each. The important feature was the participation of both academic and industrial specialists. Many well known experts in the subject contributed to the programme as well as plenty of young participants.

The main topics were the following:

- excitation, synchronisation and stabilisation of vibro-impact processes
- dynamics of vibro-impact machines and technological processes
- non-linear phenomena due to vibro-impact interaction of solids

getting to know the various people and organize one or two initial Colloquia. We didn't take any firm decisions about the future development of EUROMECH. Anyway, it was never a case of two directions being in opposition."

When Kuchemann died in 1976, this uncertainty about the direction EUROMECH should take had already disappeared and attention was mainly focussed on the university groups. "I think it is fair to say that the universities now dominate the organization."

Batchelor and others felt that organizations like the International Congress Committee (ICC) and the International Union of Theoretical and Applied Mechanics (IUTAM)[1] did not provide the means which were needed for the organization of small informal discussions on mechanics topics. "I and other people felt that there was a need for what one might call an intermediate organization, not as wide as IUTAM but on the other hand wider than a single country. And Europe seemed to us to have a need which neither of these two types of body were filling."

Batchelor became the first Chairman of the European Mechanics Committee (with Küchemann as its first secretary) and retained this position until 1987. In 1972 the German professor Hans Fernholz, now President, joined him as Associate Secretary, becoming Secretary in 1975, continuing until 1990.

The concept of holding "European Mechanics Colloquia" with the cooperation of all European countries was suggested by the U.K. National Committee for Theoretical and Applied Mechanics, and discussed as a proposal at the XIth. IUTAM Congress at Munich in September 1964. The participants in this discussion regarded themselves as an Interim Committee for European Mechanics Colloquia (EUROMECH) until such time as sufficient experience had been gathered and an appropriate formal committee could be established. Both Küchemann and Batchelor were members of the U.K. committee, where the idea of EUROMECH must have been born. Both were present at the Munich discussion, as was Professor Rudolf Wille, who organized the first EUROMECH Colloquium in Berlin in April 1965. This was before even the actual official establishment of the Committee, which demonstrates the founders' original philosophy: just let's call some people together to talk about mechanics, without any 'official' organization behind it.

"Some people came together and said: this is EUROMECH. There were no official statutes, but there was something which we called 'working rules' or something like that, a one-page document. It set out the purposes of EUROMECH Colloquia and the way they should be run. We had firm ideas about the need for informality and we put the emphasis upon friendliness between

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[1] IUTAM was founded in 1946. It more or less emanated from the ICC, which had organized the well-known International Congresses for Applied Mechanics since 1924. Batchelor once was treasurer of the ICC. EUROMECH has been an Affiliated Organisation of IUTAM since 1978. Further reading: S. Juhasz (ed.), *IUTAM; A short history* (Springer, Berlin etc., 1988); *IUTAM 1946-1996; Fifty years of impulse to mechanics* (Kluwer, Dordrecht etc., 1996).

representatives of different countries. We thought that sharing technical competence and interest in research would make for a fruitful, productive atmosphere; and it did. I think EUROMECH meetings were not unique, but they showed how valuable such a Colloquium could be. I think that they had a name, a reputation for this. Some of the EUROMECH Colloquia were the best meetings that I and others have taken part in."

Anti-German feelings, and other such national feelings, had disappeared by the time EUROMECH was founded; at least Batchelor has never detected them. However, other 'political' problems did show up. "The Russians always presented a particular problem. They did not really participate wholeheartedly in EUROMECH meetings or its organization. One of the reasons was the great size of the Soviet Union. There were questions about what parts of the country you could regard as part of Europe or not. Of course the scientists of the Soviet Union had problems because they were not allowed to leave their country in most cases, and when they did come, they were kept under surveillance. However, that changed in due course. For other communist countries it was clearer that they were part of Europe and they wanted to make connections with EUROMECH which were as close as possible, particularly Poland."

From the beginning there was a Pole on the Committee, Wladek Fiszdon (now the second of our Honorary Members), and soon the first Colloquium in Poland was organized. "The Poles had started a series of biannual fluid mechanics meetings, which were very much the brainchild of Fiszdon. He could see that the gaps between the scientists in Eastern and Western Europe were widening because of the restrictive attitude of the Soviet Union. So he began the biannual conferences, in particular in fluid mechanics. The ideal was to have approximately equal representation from the two sides of the so-called Iron Curtain. They were very successful; the Poles have a gift for generating warmth and friendliness. They were also rewarding scientifically. So that was a case of an initiative by the Poles which had the same general intention as the various EUROMECH Colloquia. The Polish meetings were broad, while the EUROMECH Colloquia were specialized meetings, but both were successful and interactive. Each was made better by the fact that the other was also a strong series of meetings."[2]

In 1988 the first Colloquium was organized in the Soviet Union, in the city of Tallinn in Estonia. This was at the time when Professor Juri Engelbrecht became a member of the Committee. "The Committee met in Tallinn. It met once a year, usually at a place where there was to be a EUROMECH Colloquium. I went to the meeting in Tallinn."[3]

"No money was needed in the beginning because the individual Colloquium had a

[2] In December 1982 Batchelor wrote to Prof. A. Sawczuk: "We are all hoping that martial law will be lifted during this month, and that conditions in Poland will become normal again so that useful scientific exchanges can be resumed. EUROMECH would not be the same without Polish participation."

[3] In later years, some 'special' Colloquia were organized in Russia. The one on the 'Influence of microstructure on the constitutive equations of solids' was held on a boat sailing from Perm to Moscow in June 1993. In September 1994 a colloquium on vortex motion was held at a research institute in the Ukraine.

EUROMECH Colloquium 384

Steady and Unsteady Separated Flows

Chairmen: P. W. Duck and A. I. Ruban, Manchester

EUROMECH 384 took place in Manchester on July 6th-9th, 1998 with 60 participants from 11 countries.

There were seven invited lectures, together with 37 contributed talks on a wide range of problems related to separated flows, including incompressible /subsonic/ supersonic flows, internal and external flows, two- and three-dimensional flows, and laminar and turbulent flows.

One of the aims of the meeting (which was accomplished) was to bring together experimentalists, theoreticians and computational fluid dynamicists.

Wider issues that were addressed included our lack of understanding of globally separated flows (except in some very special cases) the failure of practical turbulence models in the separated/separating regimes, and also the interplay between the transition and separation processes.

One of the keynote speakers was Sir James Lighthill, who just a few days after the meeting died tragically; a number of participants from the meeting have been invited to submit papers (based on their contributions) to be compiled by the chairmen in a special theme issue of the Philosophical Transactions of the Royal Society, which will be dedicated to Sir James.

EUROMECH Colloquium 385

Inelastic Analysis of Structures under Variable Loads: Theory and Engineering Applications

Chairmen: Dieter Weichert, Aachen and Giulio Maier, Milan

The colloquium took place from September 8th. to 11th., 1998, in Aachen. It was attended by 57 scientists from 18 countries, 11 attendees coming from outside Europe. The meeting can be regarded as the continuation of the scientific exchange on the analysis of inelastic structures under variable loads in the context of EUROMECH colloquia, with preceding conferences in Warsaw (1992) and Palermo (1983). In 41 lectures, the participants reported on researches recently or currently conducted from theoretical, numerical and experimental points of view in this field of increasing technological interest. Applications in civil as well as in mechanical engineering were presented, related to the analysis of limit states of structures under variable repeated mechanical and/or thermal loading.

EUROMECH Colloquium 383

Continuation Methods in Fluid Dynamics

Chairmen: D.Henry, H.BenHadid, Lyon and H.Dijkstra, Utrecht

The colloquium had its origins in a French research group working on Numerical Fluid Mechanics and took place at Aussois (French Alps) on the 6th.– 9th. September 1998. There were 32 participants from fifteen countries, six outside Europe.

Continuation methods are a powerful and efficient tool for investigating nonlinear phenomena in dynamical systems. An important area of application of these numerical techniques is in hydrodynamic stability problems, where bifurcations lead to multiple equilibria and complex temporal behavior.

There were twenty-four oral presentations adressing five main topics:

A General methodology
B Solvers
C Hopf bifurcations and limit cycles
D Shear-driven flows
E Convection

Concerning the topic of general methodology, we first had an introductory talk on the basic ideas of continuation, and then a presentation of different approaches to the building of stability and continuation codes. For the solvers topic, we had a talk on the solution of linear systems and eigenvalue computation in the case of large sparse systems. Some Hopf bifurcation calculations in large problems were presented, but the two presentations on limit cycle continuation techniques concerned applications to small problems. Finally, the main applications to fluid mechanics problems concerned shear-driven flows and convection.

The talks were interesting, of a good scientific level, and covered a large range of fluid mechanical situations. From post-colloquium reports, it seems that people learned a lot from the talks, but also from numerous informal and inter-personal discussions. This was facilitated by the fact that conference, lodging and meals were organized in the same place, the Centre Paul Langevin, and by the pleasant atmosphere among people. It would have been interesting to have more contributions from mathematicians on linear algebra solvers, which constitute a key point for the use of continuation methods for large problems. The colloquium could also have benefited people working in Computational Fluid Dynamics, not yet using continuation methods.

Material presented at the colloquium will be published in a forthcoming issue of *Notes on Numerical Fluid Dynamics* (Vieweg publications).

Chairman and if he wished to arrange a special dinner or something of the kind, then the practice was for him to seek reimbursement from the local laboratory or department. So the Chairman of each Colloquium met such modest expenses where he could. But there was no money handed on from one Chairman to another. Many people were astonished that the whole thing could run without the need for money to change hands. But that was not a limitation or a defect; on the contrary, it was a great help. If you don't have to bother about money, that makes an enormous difference to the administration."

To be continued.

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EUROMECH CONFERENCES 1998

EUROMECH–MECAMAT 98 (EMMC-2)
2nd EUROPEAN MECHANICS OF MATERIALS CONFERENCE

Magdeburg, Germany, February 23rd. – 26th., 1998

The meeting took place in the Parkhotel Herrenkrug, organised by the Institute of Mechanics of the Otto-von-Guericke-University of Magdeburg, in cooperation with F.Sidaroff (Lyon) and R.Billardon (Mecamat, Cachan). There were 103 participants from 18 nations, with 12 from Eastern Europe and one from as far as Australia.

Materials with intrinsic length scales or generalised continuum mechanics forms a subject both old and young, flourishing in the present though having a long history. The conceptual and technical background was esplored in the sixties, culminating in the 1968 Freudenstadt IUTAM symposium on *Mechanics of Generalised Continua.* (From its inception, the meeting was thought of as *Freudenstadt Thirty Years On.* We were honoured that Prof.Kröner took part in the meeting and chaired the opening session.) The connection between mechanics and the material sciences had not then been established. The length scales taken as characteristic of the models was macroscopic, certainly much larger than that of the effects of interest. Interest in these theories has recently revived. These classical approaches are now much better understood and need refinement to account for shear band formation and related phenomena. Starting from non-local damage or plasticity models as introduced some ten years ago for mathematical and numerical regularization, these concepts have rapidly spread over the whole field of the mechanics of materials, as demonstrated by this meeting. The different branches of material science and continuum mechanics now interchange ideas and concepts much more freely than ever before.

At the conference dinner a small theatrical presentation showed some of the historical experiments on air pressure originally due to Otto von Guerecke, who worked in Magdeburg both as a physicist and a politician.

There is a web page at: http://www.uni-magdeburg.de/ifme/mecamat

The conference proceedings were to be published in the October 1998 number of *Les Editions de Physique.*

EUROMECH Colloquium 380 and ERCOFTAC SIG 33 Conference

Laminar-Turbulent Transition Mechanisms and Prediction

Chairmen: U. C. Dallmann and H. Bippes, Göttingen and D. S. Henningson, Bromma

EUROMECH Colloquium 380 was held in Göttingen from September 14 - 17, 1998 as a sequel to EUROMECH 359 (Stuttgart 1997). The main aim was to present the advances achieved since then in understanding the mechanisms and prediction of laminar - turbulent transition. The conference had 66 participants from 13 countries and included 45 presentations divided into the following sessions:

Session 1:	2D Boundary layers
Session 2:	Boundary layer receptivity
Session 3:	2D Separated flow
Session 4:	Attachment line flows
Session 5:	3D Boundary layers Session 6: Subcritical transition and bypass transition
Session 7:	Centrifugal instability and Görtler vorticies
Session 8:	High-speed boundary layers
Session 9:	Internal flows
Session 10:	Miscellaneous topics

The unique mix of temporal and spatial direct numerical simulation (DNS), parabolised stability equation (PSE), nonlinear equilibrium solution, asymptotic expansion and experimental approaches was used to shed light on the laminar - turbulent transition mechanism and its prediction. The closing discussion summarised the state of the art and indicated which problems should be tackled most urgently.

Besides EUROMECH, financial support was also kindly provided by DLR, ERCOFTAC, Daimler-Benz, AEA Technology and Daimler-Benz Aerospace.

EUROMECH Colloquium 381

Cancelled

EUROMECH Colloquium 382

No report received at the time of going to press

EUROMECH Colloquium 378

Nonlocal Aspects in Solid Mechanics

Chairmen: J.F. Ganghoffer, A. Brillard, Mulhouse, France

The Colloquium took place on April 20th-22nd at the Regional Sport Centre in Mulhouse, located on the Campus. There were about 40 participants from 11 countries, with a large representation from Italy and France. Almost every participant had a communication, either oral(30) or as a poster (10). The contributors were mechanicians and applied mathematicians, with a major representation form the first group.

Two months after the EUROMECH-MECAMAT Colloquium in Magdeburg, this Colloquium was intentionally oriented towards fundamental aspects in nonlocal mechanics. It is noticeable that most of the participants were not present at the Colloquium in Magdeburg. The contributions were grouped into five sessions, including one poster session. All posters were presented shortly in an oral pre-session. The first session of the meeting was devoted to the formulation of higher order gradient models and models for nonlocal continua; thermodynamics appeared to play an important role. A second session was organised around the mathematical and numerical aspects, including the very recent Arbitrary-Lagrangian Eulerian remeshing technique. The session on micromechanics provided the necessary articulation between the formal and the physical aspects of nonlocality, and made clear to everybody that physical motivation for the setting up higher of order theories at the macroscopic scale is a crucial issue. The sessions on fracture mechanics and dynamic aspects showed important and fertile fields of application in nonlocal mechanics.

The general feeling was that the aims of the Colloquium had been successfully accomplished, due to the relatively small number of participants, and the pleasant environment. The participation of more than 20 young researchers (below 35) favoured informal discussions and promoted interesting questions.

EUROMECH Colloquium 379

Aerodynamics and Aeroacoustics of tracked high-speed ground transportation

Change of date

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7th. EUROPEAN TURBULENCE CONFERENCE (ETC 7)

Saint-Jean Cap Ferrat, France, June 30th. – July 3rd., 1998

ETC7 was held under the joint auspices of EUROMECH and ERCOFTAC, with 208 participants from 20 countries. There were 8 invited lectures (S.Fauve, E.Hopfinger, P.Monkewitz, L.Kadanoff, D.Laurence, H.K.Moffat, K.Gawedzki and A.M.Yaglom), 59 10-minute papers and 80 3-minute presentations complemented by posters. The selection of papers was made by an International Scientific Committee appointed by EUROMECH and chaired by Prof. F.Nieuwstadt. Local organisation was done by the "Observatoire de la Côte d'Azur", the conference being held in the village-like but technically sophisticated environment of the "Médiathèque" of Saint-Jean Cap Ferrat. A number of generous sponsors made it possible to give financial support to 40 persons, classified as young scientists, eastern Europeans, or both.

Experimental, numerical and theoretical presentations fell under the headings of: transition and dynamical systems; numerical simulation; high Reynolds numbers and intermittency; vortex dynamics; transport of passive scalars; industrial applications and modelling; astro/geophysical flow and convection.

It may be of interest to note that in the special session devoted to Kolmorogov, Prof. A.M.Yaglom recorded that a full year elapsed between the time Kolmogorov understood that the solutions in the limit of infinite Reynolds number should be self-similar, and the time at which he used energy arguments to determine the correct scaling exponent. Yaglom also stressed that in his 1962 paper, Kolmorogov introduced a new type of random function, characterised by the properties of ratios of increments of velocity components, the study of which has yet to be undertaken.

New high Reynolds number experiments, no longer exclusively dependent on the use of large-scale facilities, combined with new types of imaging, non-intrusive probe methods, processing and simulation provide data which impose significant restraints on possible theories. The 1961 Marseille conference saw the introduction of a phenomenological theory of intermittency, the major stumbling block of the 1941 Kolmorogov theory. We now have, for the first time, a real systematic theory which explains, for a class of passive scalar problems introduced by Kraichnan, why dimensional analysis sometimes gives the wrong answers. Numerous contributions were devoted to such topics.

Comments by many participants indicate high satisfaction with both content and organisation. Prof. L.Kadanoff (Chicago) remarked on the strong presence of young speakers, a sign of the vitality and renewal of the subject.

The proceedings of the conference were to have been published as:
Advances in Turbulence VII, ed. U.Frisch, pp.613, Kluwer 1998.

Details may also be found on: http://www.obs-nice.fr/etc7

EUROMECH–MECAMAT 98 (EMMC-3)
3RD EUROPEAN MECHANICS OF MATERIALS CONFERENCE

Wadham College, Oxford, November 23rd – 25th, 1998

Following France (EMMC1) and Germany (EMMC2), it was the United Kingdom's turn to host the 3rd European Mechanics of Materials Conference (EMMC3) and continue with the series of European conferences in the field of mechanics of materials. These are held on a yearly basis under the auspices of the European Mechanics Society and the French Society for Mechanics of Materials. EMMC3 was jointly organised by Imperial College (UK) and the Ecoles de Mines de Paris (France).

The conference focused on the "Mechanics and Multi-Physics Processes in Solids: Experiments, Modelling and Applications". It attracted an international group of over 70 researchers from 13 different countries working on coupled phenomena in a variety of material-related disciplines. The contributions covered a range of experimental, theoretical and modelling work and strongly contributed to the development of an awareness of recent achievements and new application areas for multi-physics / multi-disciplinary approaches. The conference proceedings have been published containing written versions of the conference contributions, and the corresponding full papers have been reviewed following standard journal procedures. Accepted papers will be published in a special issue of the *Journal de Physique* in May 1999. The conference was by all accounts a success and took place in the very special atmosphere provided by the historic Wadham College and Oxford, which contributed to the lively and interesting discussions which often continued to late hours.

We thank all of the participants for an exciting and informative symposium, and all of the authors who have contributed to what we believe will be an important reference for many years to come. The reviewers, who spent a considerable amount of time commenting on the technical papers, and the Conference and Scientific Advisory Committee members are very much appreciated. Financial support from the French Society for Mechanics of Materials, Les Editions de Physique Sciences, and Elsevier Science are also gratefully acknowledged.

The next and 4th European Mechanics of Materials Conference (EMMC4) will take place in Cachan, in the outskirts of Paris, during 6-9 September, 1999, and the meeting will be dedicated to the topic of "Mechanisms of Degradation and Mechanics of Damage". We look forward to seeing you there.

Further details may be found on: http://www.me.ic.uk/materials/emmc3/

EUROMECH Colloquium 377

Stability and Control of Shear Flows with Strong Temperature or Density Gradients

Chairmen: F. Marsik, Prague and P. A. Monkewitz, Lausanne

EUROMECH 377 took place on May 20th - 2lth at the Institute of Thermo-mechanics, Academy of Sciences of the Czech Republic in Prague, Czech Republic. There were 15 participants from 6 countries with a considerable number of young researchers and doctoral students from the Czech universities and research institutions attending. The principal topics were introduced by four main lectures:

B. P. Axcell: *Investigation of a Turbulent Buoyant Sodium Jet*

F. Marsik: *Laminar-Turbulent Transition in Heated Free Jet*

P. A. Monkewitz: *The Effect of Density Gradients and Heated Release on Shear LayerStability*

O. I. Yashko: *On the problem of Turbulent Arcs Modeling*

Topics discussed included the onset of instabilities in cooled and heated free jets and jets with density gradients generated by a pair of concentric axisymmetric nozzles. The condition for absolute instability of a heated jet was further enhanced by a possible coupling existing between outer and inner (burner, arc chamber) jet regions. The influence of heated/cooled boundaries on the laminar-turbulent transition in channels and past profiles was shown. The strong sensitivity of wall jet stability (Coanda effect) to a relative small change of wall temperature (20°C) could have some immediate practical application.

Numerical methods are capable of determining the onset of instability (frequency and modal shape) but the nonlinear region is still an open problem. Direct simulation (LES) is at the beginning, however the stable states are described more satisfactorily.

The colloquium was closed by laboratory demonstrations of two experiments showing stability control by temperature gradients:

- Onset of absolute instability of a plasma plume
- Separation of a wall jet.

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degree of adaptivity, self-learning processes, even repairing processes cannot be achieved by engineering. Nevertheless, some principles and structures are helpful for technical design such as multilayer control concepts, as little hierarchy as possible, finite state aspects and flexibility with respect to unexpected environments.

EUROMECH Colloquium 376

Waves in Two Phase Flows

Chairmen: Can F. Delage, Istanbul, and David G. Crighton, Cambridge

EUROMECH 376 "Waves in Two-Phase Flows" was held in Istanbul, Turkey at I.T.Ü Vakfi Maçka Sosyal Tesisleri on April 27th.–30th.,1998. There were sixty four participants from seventeen different countries (including Japan and the Americas) and fifty one papers were presented (all were oral). Topics discussed included waves in dispersed flow with nonequilibrium condensation and evaporation, waves in bubbly liquids, waves in porous media, waves in dusty gases, waves in fluidized beds together with capillarity, gravity, roll and water waves. The papers were presented in fifteen sessions:

1 & 2	Fundamentals of two-phase flow.
3 – 5	Waves in bubbly liquids.
6	Waves in porous media and dusty gases
7	Waves in fluidized beds.
8	Gravity, roll and water waves.
9	Waves in multiphase mixtures
10 – 12	Condensation waves
13	Evaporation waves and boiling
14	Mixed topics

The discussion in the closing session was chaired by A. Kluwick of TU Wien indicating the balance between theoretical and experimental contributions in the Colloquium. The need for further interactions between various groups working on waves in multiphase flows were emphasised by different participants.

As for the social program, a half-day city tour on April 29 comprising visits to historical places such as Hagia Sophia, Blue Mosque and Topkapi Palace was organized. The Colloquium Banquet took place on the same night at The Orient House with a characteristic Turkish show for entertainment.

The Colloquium closed up with the will of all participants to meet in a few years time at an IUTAM meeting on the same topic in Europe or the Americas.

EUROMECH Colloquium 373

Modelling and Control of Adaptive Mechanical Structures

Chairmen: U. Gabbert (Magdeburg), E. Breitbach (Braunschweig), H.S. Tzou (Kentucky)

EUROMECH 373 was held from March 11th - 13th, 1998, at the Upstalsboom Hotel Ratswaage Magdeburg. There were 74 participants from 14 countries, among them 25 participants from industry. Members of the local organisation committee and PhD students boosted the total to 115. There were 48 presentations which have been collected as the published proceedings. After review most of the papers will be published in a volume of the VDI Fortschrittsberichte, Düsseldorf. An excellent opening speech to the colloquium was given by the Prime Minister of Sachsen-Anhalt, Dr. Höppner. The main objective of the Colloquium was to provide a forum for scientists and engineers for discussing recent developments in the field of adaptive structures.

The scientific activities were addressed in the following 11 sessions:

- Adaptive Structures Technology
- Adaptive Material Systems and Actuators - Damage Detection in Smart Materials
- Finite Elements for Adaptive Structures - Control of Adaptive Structures (I, II) - Multilayered Structures and Composites - Modelling of Adaptive Structures (I, II) - Neural Networks and Shape Detection
- Optimization of Adaptive Structures
- Adaptive Structural Systems (I, II)
- Application of Adaptive Structures

The opening session contained three extended lectures by H. Baier (München) on "Analytical and Experimental Results for Active Noise Control", J. Holnicki-Szulc (Warsaw) on "Adaptive Structures with Semi-Active Interface" and H. Preumont (Brussels) on "Active Tendon Control of Large Trusses".

There was time enough to discuss all papers in detail. Several participants used the offer of the hosts to visit the laboratories of the research centre Innovationskolleg "Adaptive Mechanische Systeme" at the Magdeburg University.

At the evening of the second day a banquet was held in the main hall of the Palais am Fürstenwall. Otto von Guericke, the famous Magdeburgian scientist and mayor, visited the Palais after dinner. He gave a very interesting overview of his life and presented some of his well known experiments regarding the vacuum.

At the end of the conference the overwhelming consensus of comments received from the participants was that the meeting was very successful.

EUROMECH Colloquium 374

Recent Computational Developments in Steady and Unsteady Naval Hydrodynamics

Chairmen: Michel GUILBAUD, Poitiers, Gérard Delhommeau, EC de Nantes

The 374th Colloquium took place on the new site of Futuroscope, in the modern building of the Ecole Nationale Supérieure de Mécanique et Aérotechnique, close to Poitiers, from April 27th-29th April 1998. There were 40 participants from 9 countries. There was one invited lecture, by Professor Volker Bertram from Technical University Hamburg-Harburg (Germany), "Marching towards the numerical ship model basin". During this presentation, Professor V. Bertram made a full up to date panel on the possibilities and limitations of the computational fluid dynamics in Naval Hydrodynamics, both for viscous (without gravity waves) or inviscid flows, particularly concerning seakeeping. There were also 25 other contributions.

The proceedings and the sessions have been divided into 5 distinct topics:

l. Coupling methods (3 papers): Viscous effects and coupling between the Navier-Stokes equations and potential flow.

2. Time-domain and non linear problems (7 papers): Second order, non-linear and large amplitude wave motions. Computations in the time domain.

3. Resolution of Navier-Stokes equations (6 papers): Calculations of complex flow fields, predominately based on Reynolds-averaged Navier-Stokes equations.

4. Frequency domain (6 papers): Rankine panel and Kelvin singularity based computations, various calculations of the diffraction radiation.

5. Steady flows and miscellaneous (3 papers): Optimisation of hull form; the accuracy of boundary integrations using diffraction with forward speed; interfacial waves due to a movingcylinder in a two layer fluid.

A full set of proceedings with 310 pages has been edited.

The informal atmosphere and the limited number of participants have led to fruitful contacts and quite interesting discussions between the various researchers at the end of the presentations, but also during the various coffee breaks, the meals and the banquet. During this last one, a musical atmosphere has been offered to the participants.

Thanks to the sponsors and more particularly the local ones (Conseil régional Poitou-Charentes and Conseil Général de la Vienne) extra subventions have been given to 2 Russian professors (no charge for the Congress and hotels, trains and meals paid in France) and to 6 researchers under 35, instead of only 3 as paid for by the Euromech Committee.

EUROMECH Colloquium 375

Biology and Technology of Walking

Chairmen: Prof. Dr.-Ing. Friedrich Pfeiffer, Munich, and Prof. Dr.rer.nat. Holk Cruse, Bielefeld

EUROMECH 375 took place on March 23rd. – 25th. 1998 at the Technische Universität München, with 65 participants from 14 countries, many of whom were to a greater or lesser extent assisted by generous financial support from the DFG, the Koerber Foundation and the Bavarian Ministry of Culture.

The colloquium was opened by a welcome from the local chairman Prof. Pfeiffer, who at the same time spoke as a representative of EUROMECH. He focused his welcome speech more on technical aspects, whereas Prof. Cruse addressed more directly his biological colleagues. The Vice-President of the Technical University München, Prof. Heinzl, welcomed all participants in the name of the President and the University.

The scientific program focused on

- Design and control of walking machines.
- Autonomous and intelligent walking.
- Biological walking of bipeds quadrupeds and multilegged animals.
- Control concepts in biological walking.

Twelve sessions with, altogether, 40 lectures, were arranged within these topics. Remarkably, there were no no-shows, all the lectures proposed were delivered

Bringing together scientists from the technical and the biological side proved to be very fruitful and promising. Engineers try to find intelligent solutions with respect to optimal design, to optimal actuators and to optimal control and are nevertheless limited to the type of functionalities which are realized in technical components. Biology is overwhelmingly concerned with control, sensors and actuators, but all the principles behind them are at least partly still cloudy.

Design and control of walking machines included many new and interesting aspects of all types of walking machines, with special focus on the tube crawler developed in München funded by the Koerber-prize. Machines with two, four and six legs, applications in forests (Finland), in servicing (Germany) while some nice ideas with respect to bio-robotics and one-legged solutions were discussed. The discussions were always vivacious, possibly due to the interdisciplinary effect.

From biology came findings in walking kinematics, in design (spider leg) and above all in biological control. The biological solutions with regard to kinematics, statics and dynamics obviously are technically realisable, though they may not be reasonable in many cases. Anyway, biological solutions are better optimised, mechanical components are excellently utilised. On the control side most biological realisation can only roughly be transferred to technology. The high