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President's Introduction

This April the EUROMECH Council met in Cambridge to discuss the principal future business of the Society. The meeting was, as ever, lively. We assessed twenty-one proposals for EUROMECH Colloquia, approving thirteen meetings for the year 2000 and, at this stage, three for 2001. Preparations for the three large upcoming conferences, in Solid Mechanics, Fluid Mechanics and Turbulence were reported as proceeding well.

The membership of the Society continues to increase and the Council thought it appropriate to double the support provided for selected junior researchers attending EUROMECH Colloquia to 600 EURO for each meeting.

It is one of our most important goals to support the well-being of Mechanics in Europe and this can not be achieved without more support for those who will further develop the study of solid and fluid dynamics in the next century. To this end it has been agreed to provide a 'hiring fair' for doctoral and post-doctoral workers on the Society's web page, as outlined in the note on page 19.

Hans-Hermann Fernholz
President, EUROMECH

Contents

E. Stein and W. Schiehlen	On Academic Education in Mechanics	2
EUROMECH	Colloquia in Year 2000	6
EUROMECH	Conferences in Year 2000	12
F. Alkemade.	EUROMECH –An Aural History: Part 2	13
EUROMECH	Hiring Fair – Post-doctoral Appointments	19

EUROMECH Officers Addresses may be found on
<http://www.euromech.cz>

On Academic Education in Mechanics

E. Stein, Hannover and W. Schiehlen, Stuttgart

Thoroughly convinced that a profound academic education by undergraduate and graduate courses in mechanics is absolutely necessary for all engineering disciplines in a modern information and communication society, the Gesellschaft für Angewandte Mathematik und Mechanik (GAMM) set up a Committee on Education in Mechanics in 1994. This Committee co-operated with a German branch of GAMM, the Deutsches Komitee für Mechanik (DEKOMECH) in preparing this memorandum, which was accepted by the German Branch of the General Assembly of GAMM and by DEKOMECH during the Annual Meeting 1999.

1. Primary Goals for Engineering Education in Mechanics.

A recognised academic engineering degree has to include fundamental understanding and reliable development by the students to guarantee the safety of engineering products. A basic contribution to this development is provided by mechanics for recent and future technologies.

The increasing importance of information and communication technologies requires solid fundamentals for engineers. The unconsidered use of complex software systems by pseudo-learned people may have fatal consequences. In particular, the engineering evaluation of numerical results requires independent thinking. The education of adepts with preconceived ideas leads to unreliable products and economic losses. Therefore, the art of adequate physical-mathematical modelling is vitally important for progress in technology. The expectation that in future more jobs will be available in the service industries than in research and development departments is accepted. But the service people in software and supplier companies have to be reliable engineers too. Long-term profits require solid knowledge of science and engineering.

The engineering departments of university and engineering colleges are called upon for the promotion of mechanics as the most fundamental science related to modelling and simulation. For graduate studies theoretical mechanics have to be further extended by experimental and numerical mechanics, often denoted as computational mechanics. Future engineers have to contribute to technology and economic progress. But they have also to act as intellectuals asking critical questions of society. They require solid knowledge on a scientific basis.

2. Recent Developments in Mechanics Related to High Technologies.

New computational and analytical methods such as finite elements and boundary elements are necessary for the solution of complex linear and non-linear multi-field problems. Some examples are automobile crashes, bridge failures, structure and

final discussion."

A quite different problem arose during EUROMECH 33 (Berlin, September 1972):

"One disadvantage of the informal seating arrangement seems to have consisted in having induced those who partook in discussions to speak in a low voice, and little success could be achieved to overcome this. A short course in 'low English' for participants from the Continent may be a solution."

(to be continued)

Post-Doctoral Appointments.

At its meeting in April the EUROMECH Council decided that in the interests both of organisations and post-doctoral workers in mechanics, we should try to run a simple appointments service. If sufficiently minimal we should be able to operate without charging, though this is not an undertaking to continue doing so, and at a later date institutions may be asked to pay.

A 'notice' is intended to open communication, not give a full description of a post. The purpose is to publicise the existence of the post, and direct potential applicants to the web page of the organisation in question to find the details..

A 'notice' for a post should contain:

The name of the organisation.

The field of work involved - in a minimum of words, as for key words used in indexing a paper.

The type of worker required - e.g. 'Post-Doctoral worker with experience of PIV'

The proposed starting date.

The organisation's web address.

The 'notice' should be sent as text only to the Secretary General at

< ok @bivoj.it.cas.cz >

Notices may be edited before they are posted.

Notices will appear on the Society's web page at

< <http://www.euromech.cz> >

the report of EUROMECH 7, held in April 1968 in Grenoble, we already read about "the traditions of the EUROMECH Colloquia". EUROMECH 8, on thermoplasticity, was held in October 1967 in Jablonna, near Warsaw in Poland. Here, 25 visitors were Polish and 12 came from abroad.

Sometimes things went wrong. At EUROMECH 9, held in Paris in February 1968 on 'Rarefied gas aerodynamics', none of the important researchers from Göttingen showed up since these scientists preferred to keep their papers for an 'official' symposium on this topic some time later. The French organizers advised future Chairmen of the Colloquia to make clear in their invitations what kind of contributions were expected. The organizers of EUROMECH 13, on the same subject (Teddington, July 1969), had requested the participants to present also "review papers and those discussing difficulties and problem areas" but not many of these were offered. The participants had complained that "too many of the papers attempted to describe complete pieces of work instead of reviewing current activity". They also found the number of papers too large. The organizers concluded that the field of rarefied gas flow aerodynamics was growing steadily and that for future Colloquia, subthemes had to be taken.

At EUROMECH 14 (Skokloster, Sweden, June 1969) three participants (two from Eastern Europe) could be subsidised, thanks to a grant from the Division of Education and Research of the Council of Europe.

EUROMECH 16 (Berlin, April 1969) had a theme which included the Coanda effect, the topic of EUROMECH 1. However, this time only three contributions were made on this effect. This led the reporter to remark: "this topic seems to have become less interesting". Two points of criticism were heard at this Colloquium: a desire for "a more effective announcement" (e.g. in the Journal of Fluid Mechanics) and the poor quality of some slides.

In the report of EUROMECH 17 (Cambridge, July 1970) one reads: "The three days of the meeting were fully occupied with the contributed papers and discussions, together with an introductory survey at the beginning and a general discussion at the end. We now realise that the participants would have appreciated a half-day left free in the middle for local sightseeing etc. [...] There were no difficulties of language. All participants were informed that they could speak in any language, as they wished, but in fact English was used throughout [...] A number of enquiries were received from the U.S.A. and Canada [...] We suggest that future notices of EUROMECH Colloquia [...] should emphasize that the meetings are limited to people working in Europe."

Another recurring point of discussion arose during EUROMECH 19 (Cologne, December 1970): "Many of the participants asked the Chairman during the meeting for the written versions of the papers presented. Although the Chairman had reminded them that no proceedings of EUROMECH Colloquia are published, so as to encourage contributors to report on current work ..., he feels that it would be desirable to find some means for preserving the contents of the presentations. [...] he intends to send out abstracts of the contributions together with an account of the

dynamics of aircraft, subsonic and supersonic flows of aircraft and spacecraft. All these problems are characterised by a combination of numerical mathematics, scientific computation and applied computer science with a specific engineering background.

Micro-mechanical material theory and the computation of high technology materials such as composites with complex behaviour are required. Macro-mechanical properties are computed from meso- and micro-mechanical models providing new insight. This is also true for fluids with turbulence and phase transition.

Identification and optimisation of thermo-mechanical processes and structures are introduced to the design. The reliable determination of material and structural parameters from measured data by deterministic and stochastic methods is most important for reliable simulations. Optimisation methods for complex engineering structures are in development and will be included in software systems in the future.

The mechatronics and adaptronics of dynamical systems are new subjects. The automation of manufacturing processes requires fast controlled motions. These new branches of mechanics require co-operation with electrical and control engineering as well as with computer science. Adaptronics is related to adaptive structures proposed for airfoils, resulting in always stable and economic flight operations. It turns out from these examples that planning, design, computation and production of all new products in industry requires basic knowledge and independent thinking of all members of a project team. It is not at all sufficient just to press some buttons and to rely on commercial software. Basic knowledge and a general view on different disciplines are necessary.

Academic education should be devoted primarily to basic knowledge. General views on different topics may be obtained by continuing education courses available nearly everywhere. Basic knowledge is a requirement for successful development in high technologies.

For engineers, finance and management are not part of their basic knowledge. Demands from industry for more management education of engineers are not justified. Ability for teamwork in these matters can be gained by supplementary courses.

3. Recent Curriculum for Mechanics in German Universities.

The first two years of an academic engineering education are devoted to undergraduate studies. During that period altogether 16 - 18 hours are taught to mechanical engineers, 12 - 18 hours to civil engineers and 10 hours to electrical engineers. In graduate studies there are many differences, i.e. the detailed numbers of hours taught are only available locally.

Institutes of mechanics are usually part of the engineering departments. However, at some universities mechanics has its own department as in the Technical University of Darmstadt.

4. *How much do Engineers need Mechanics?*

In undergraduate education mechanics is and has to be a compulsory subject.

It is recommended that mechanics be offered as non-compulsory subject in graduate education.

Lectures in mechanics during the first two years of undergraduate education should be evenly distributed, to allow students to understand and apply the difficult problems related to abstraction, modelling and to the solving of problems.

Examinations in mechanics are and remain difficult, so that not all students pass. Pre-selection of engineering students is not possible in Germany since there are no entrance exams. The examinations in mathematics and mechanics guarantee the intellectual power of engineering students at German universities.

Fundamental aspects of undergraduate education in mechanics are as follows:

- Careful introduction of the principles of mechanics.
- Proper physical-mathematical modelling of engineering problems.
- Model analysis and solution properties for relevant parameters.
- Analytical and numerical solutions of specific problems.
- Evaluation of results from different models and experiments.
- Engineering applications.
- Relation to other engineering disciplines.

General aspects of graduate education in mechanics are as follows:

- Mechanics is a subject in itself, combining theory, analysis, experiment and numerics.
- Modelling approaches should be as accurate as necessary and as simple as possible.
- Computational methods have to be based on numerical mathematics.
- Evaluation of computer results is necessary to avoid blind belief in numbers, graphs and animations.
- Understanding the mechanics of materials must include microscopes.
- Motion and stability characterise the dynamic behaviour of structures.
- Fluid motion and transport phenomena in science and engineering.
- Parameter identification via the solution of the inverse problem with deterministic and stochastic methods.
- Optimisation of structures, processes and systems must be included.

that this should definitely be limited to about 50 for this kind of working meeting. It was also confirmed that it is very important to invite mainly people known for their active interest in the subject and especially to encourage the participation of young people: the latter enlivened the discussions considerably and contributed in a most effective manner throughout. ... It was also very valuable to have the same Chairman throughout the meeting, although this must have been quite a strain. The right climate of informal but incisive discussions was soon established."

"The Colloquium proved again that it is quite possible in many cases to present the relevant points of an argument lucidly in as short a time as 15 minutes. But this requires careful preparation and it would seem advisable before future Colloquia to exhort contributors not to read out the usual formal paper but to remember the special purpose of these meetings, the particular points under discussion, and the special audience they are addressing and to prepare themselves accordingly with the greatest care." And Küchenmann concluded thus: "It may justifiably be hoped that this first EUROMECH Colloquium at Berlin has initiated a series of working conferences which will benefit both the research scientist and the advancement of knowledge."

The organizers of EUROMECH 2 thought that 40 would be the maximum number of participants (there were 38 present) and remarked that some "distinguished research workers" had been invited at such a late stage that some could not accept the invitation. They also mentioned the fact that only three "industrial representatives" were present, of which only one made a "direct contribution". "Speakers were asked to present their information in a visual way, to minimize difficulties of language." Nearly all did this, and the result seems to have been as successful as at EUROMECH 1.

"We did not ask contributors to bring copies of important figures to hand out. This was a mistake. ... Following EUROMECH 1 the seating was arranged around a U-shaped table with the screen, blackboard and speaker at the open end and the Chairman at the other end. This seemed to be satisfactory. ... Members assembled on the afternoon before the Colloquium, and after dinner we held a conversazione [informal talk] in the lounge. This was helpful in ensuring that the first meeting did not begin in the frosty atmosphere which often marks the opening sessions of larger conferences."

At the third Colloquium, on supersonic flow with heat addition, however, about 80 people took part. Again, this group was considered to be nearly all those working in this field. From the report: "Moreover, the view was expressed that U.S. activities as well as the limited European resources make it imperative to set up an aim and to coordinate the work. ... Pending such a setting-up of coordinated aimed research in Europe, the participants resolved to keep in touch and to keep each other informed of the progress of their activities. In this respect, too, the Colloquium has served a useful purpose which was very much appreciated by the participants."

The fourth Colloquium was even a bigger success (to some): over 170 delegates from some 12 countries took part in discussions on 'The structure of turbulence'. In

The Colloquia and Conferences

Colloquia

In the March 1990 version of a document titled *Notes for Chairmen of EUROMECH Colloquia*, we read: "The objective [of the Colloquia] is to provide opportunities for scientists from all parts of Europe, East and West, to meet each other and to discuss their current research activities. As a result of the large number of linguistic, cultural and political divisions in Europe, the natural opportunities for free exchange of scientific information and ideas are not as numerous as in other regions of comparable population size. The scientists and engineers in the small and medium-sized countries in Europe are in special need of mutual support and scientific exchanges, since no one of these countries by itself can cover adequately all aspects of mechanics."

In April 1965 the first EUROMECH Colloquium was organized at the Hermann Föttinger Institut für Strömungsforschung of the TU Berlin, chaired by Professor Wille. The subject was 'Boundary layers and jets along highly curved walls - Coanda effect'. Up to the end of 1997, some 360 Colloquia had been organized. Of most of them only reports (written by the Chairmen or others) remain⁵.

In a report on the first Colloquium, written by Küchemann, we read that 38 scientists took part from nine countries: Belgium (5), France (5), Germany (15), The Netherlands (1), Norway (1), Rumania (1), Sweden (1), Switzerland (1), and the UK (8). Küchemann reported that "no replies were received from Bulgaria, Italy, Spain and Yugoslavia" but concluded: "the aim of inviting all those working in the particular field under discussion to take part must have been very nearly achieved". He was also convinced that after the meeting "there appears to be no doubt that the EUROMECH experiment of 'workshop' meetings made an excellent start and deserves every support in its further development". And: "It became evident quite early on in the discussions that even such a restricted subject [as the topic of EUROMECH 1] has many aspects and facets and that the individual worker finds it difficult to be aware of them all and to obtain a balanced view. Consequently, the participants particularly appreciated the opportunity to get acquainted with the whole spectrum of the work and to assess the present status of the subject and the scope of the various activities in Europe."

"The need was also felt for open and free discussions to enlighten investigators about the developments presently under way and about future projects; to stimulate the emergence of fresh ideas; and to put the individual contributions and activities into perspective. It seems particularly important to bring different individuals or research teams face-to-face at an early and formative stage of the work."

"The number of participants was about right and the experience showed very clearly

- Reliability of engineering systems, and life-cycle analysis must be considered.
- Computer simulation of complex coupled processes.
- Mixed theoretical-experimental-computational student projects.
- Technology transfer between university and industry.

We consider that experiments during lectures are most important for the understanding of mechanical phenomena. Projects in laboratories and student competitions are also very important.

General viewpoints for the academic education in mechanics are as follows:

- Fascination with the power of simple mathematical models.
- Hierarchical modelling with different accuracies and comparison with numerical and experimental results.
- Analysis and synthesis of engineering problems.
- Application of electronic 'teach-ware' in lectures and for homework.
- Critical understanding for new technological developments and their interaction with nature and humans.
- Development and research with the goal of sufficiently complete and optimal solutions.

5. Conclusion

GAMM, an international society primarily for the German speaking countries and DEKOMECH, the committee representing German scientists active in mechanics, are prepared to serve as contact with respect to the development of future curricula in engineering academic education. This offer includes also future consultations and decisions on the European and international level.

The full German version of the memorandum is available on the Internet:-

<http://www.ibnm.uni-hannover.de/Mitarbeiter/Stein/index.html>

Contact: Professor Dr.-Ing. Dr.mult.h.c. E. Stein

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⁵ In future the reports of the Colloquia will be published in compressed form in the Newsletter.

EUROMECH Colloquia in 2000

EUROMECH Colloquia

are informal meetings on specialised research topics. Participation is restricted to a small number of research workers actively engaged in the field of each Colloquium. The organisation of each Colloquium, including the selection of participants for invitation, is entrusted to a Chairman. Proceedings are not normally published. Those interested in taking part in a Colloquium should contact the appropriate Chairman at the address given below.

393 *Crack initiation after extensive multiaxial plastic flow*

Prof. A.G. Atkins, Department of Engineering, University of Reading,
Reading RG6 6AY, UK.

E-mail: a.g.atkins@reading.ac.uk.

Dr. O.Kolednik, Erich Schmidt, Austrian Acad. of Science, Leoben,
March 14 – 16, 2000, Reading, UK. (Postponed from 1999)

Many structural integrity investigations/defect assessments under fault/accident conditions concern fracture in components after extensive plastic flow. Large deformation, denting and puncture is beyond existing safety assessment criteria. Failure analysis often needs to consider cases which involve extensive global plasticity preceding cracking. In most situations the bodies are supposedly initially flaw free and then subjected to global plastic strains much greater than yield strain levels. Cracks then often initiate within necks that form in the extensive plastic flow fields. The crack once initiated may propagate rapidly and then arrest as a sharp natural crack. Failure assessment procedures may then possibly say that the structure is still 'safe' (they may not of course) but an understanding of the energetics of initiation and arrest would assist safety assessment.

There are only limited experimental data and few analytical treatments, with advanced 'damage mechanics' modelling invariably applied to pre-cracked bodies. Of great concern should be the fact that many commercial FEM packages employ a criterion of maximum von Mises strain as determining ductile fracture yet experiments show that this is WRONG.

407 *Symbolic and geometric methods in multibody kinematics and dynamics*

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Prof. M.Hiller, Duisberg

18 – 21 September 2000, Graz, Austria.

The objective of the meeting is to bring together experts from the fields of symbolic and geometric methods in computational kinematics and dynamics of multibody systems. Such methods are of great interest to industry because (a) they provide very efficient computer models that can be employed in complex-task controllers and (b) they shed insight into the structure of the underlying equations, allowing the designer to obtain structural information that is not evident when applying purely numerical methods. Examples are the number of configurations of a parallel

was the idealist and I was the practical man. But things worked out well because we had the same objectives."

Batchelor was also the initiator of EUROMECH Conferences, which have been organized since the mid-1980s. "The point is that the right scale of a meeting depends on the nature of the subject. There are many EUROMECH Colloquia every year on subjects relating to turbulence. And for many of these subjects there is a high degree of specialization and relatively few people would be competent to discuss and understand the description of recent developments. So a small meeting is preferable to allow specialized discussions. But on the other hand you wouldn't want to exclude all meetings of larger size, because there are other purposes for which a broad meeting with a couple of hundred people is preferable. The IUTAM Congresses are too big for some purposes. Many people dislike the themes or the crowds walking around."

The first EUROMECH Conference was a Turbulence Conference which was held in 1986, with its genesis in discussions between E.Krause (Aachen) and H.H.Fernholz, on a visit to Aachen. Nowadays four others are regularly organized: the EUROMECH Solid Mechanics Conference, the EUROMECH Fluid Mechanics Conference, the EUROMECH Nonlinear Oscillations Conference⁴ and the EUROMECH Mechanics of Materials conference.

"I think the first Fluid Mechanics Conference in Cambridge was quite successful. Of course there is no ideal way of organizing such a meeting. But I don't think that the criticism was fundamental."

Every Fluid Mechanics Conference so far has started with a Debate, which idea also came from Batchelor. "I wasn't sure how that would go. But in the event it was quite good. It was a different kind of discussion and interaction. I thought there had to be a few lectures with the deliberate purpose of allowing expression of opinion on broad subjects. Scientific journals are not the place for these discussions. We have thought of putting 'letters to the editor' in the Journal of Fluid Mechanics, but I am not convinced that there is a good case for this. They quickly degenerate into acrimonious exchanges."

For each type of conference a special Standing Committee is appointed. There have been objections to the independent behaviour of some of these. "It can't do much harm. I think it would be better if they adhered more to the rules and procedures which the EUROMECH Committee has laid down, but ..."

It is around ten years now since Batchelor himself attended a EUROMECH Colloquium. "It's hard work understanding specialized material at such a meeting. Science is not made for old people. But I still found the same atmosphere as during the first Colloquia. It largely depends on the Chairman. He has to make sure that the meeting is a scientific success. And the personality of the Chairman is important for this."

⁴ Now renamed the EUROMECH Nonlinear Dynamics Conference.

per year, while as many as 30 might be considered"².

In the book *IUTAM: A short history*, the well-known mechanician Sir James Lighthill has tried to answer the question 'what is mechanics?'. However, this question doesn't seem to have bothered either IUTAM or EUROMECH in organizing their meetings. For Batchelor there was no need to take a rigid view on what constitutes mechanics. "If the subject interested us, than it was part of mechanics. So the field has changed, and is still changing. There is a change of emphasis, particularly in fluid mechanics, which lends itself well to combinations with other subjects. There was never any wish to restrict the boundaries. When a proposal was made members of the Committee started reading to see whether it could stand as a new subject for a EUROMECH Colloquium."

For finding new topics for Colloquia and spreading information about them, EUROMECH had appointed so-called Correspondents in each European country. "The Correspondents represented a wider circle of helpers. These were people who were generally sympathetic to the idea of EUROMECH and who would be willing to help by suggesting names of people who would welcome an invitation to a meeting. Well, it wasn't such a successful aspect of the organization. In fact, the whole business of making a match between the programme of the Colloquia and the people who might be interested to attend, that link was not a very satisfactory one. It is very hard to find people who are interested in a certain subject at a particular time. So, I think we didn't always reach the best set of participants."³

"Küchemann felt that the participants ought to be arranged in a semi-circle, people sitting at tables. But I think that's unrealistic. His ideal was to make it as much like a conversation as possible. It stimulates discussion, but it is impractical. In the first place, it brings in a gap between one participant and another one, due to the shape of the configuration. And it makes the showing of transparencies difficult too. I think the purpose of this idea - making opportunities for interjections and informal debate - is all fine, but you have got to be practical at the same time. Küchemann

² Batchelor wrote with regard to a coming meeting of the EUROMECH Committee in a letter to Prof. B. Lundberg in April 1985: "The main requirement, as you will know, is to have available a comfortable room which is appropriate in size to the needs of a maximum of eleven people and which has quiet surroundings. Everything else is secondary to this. It is good to have a short break and a drink in the middle of each morning and afternoon, and the simplest way of providing for this is to have a small table at the side of the room where there are assorted soft drinks and to which tea or coffee can be brought at the appropriate times. If there is any formal entertainment (and it is not essential), it should for preference be in the evening rather than in the middle of the day."

³ In a letter of March 1973, Batchelor wrote to Prof. N. Riley: "At the very least, we must revise the list of Correspondents along the lines you suggest, and replace the senior people by younger working people more in touch with current research. Those senior people appear on the list primarily because in the early days of EUROMECH Colloquia we had so little information about what was going on in the different countries and had to rely on the more obvious and known names. Personally I doubt if the system of using Correspondents will ever be adequate by itself. [...] Undoubtedly the best EUROMECH Correspondents are people who have themselves had the experience of trying to find suitable participants for a Colloquium; so do not be surprised if you are asked later to be put on the list yourself!"

The system of Correspondents was abolished in 1995 when EUROMECH was re-launched as a society; today the members are expected to do the job themselves.

platform or the singularity space of a robot. Currently there is intense research in symbolic analysis and geometric methods in robotics and mechanism dynamics, but this research is performed largely in isolation. A main intention of the Colloquium is to provide a common platform on which an amalgamation of these methods, or at least a mutual inspiration of the corresponding research groups, may take place. We would also welcome industrial and current research examples of systems for which symbolic and/or geometric modelling are required in order to illustrate the need for such methods in the future. This also implies mechatronic system analysis and design tools.

408 *Interactive dynamics of convection and solidification*

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Dr.-Ing.habil. P.Ehrhard, Germany; Prof. P.H.Steen, USA
18 - 22 March 2000, Chamonix, France.

The liquid/solid phase transformation is a phenomenon occurring in a wide range of important technical and natural processes. The manufacture of single crystals, casting, soldering, welding, treatment of surfaces using high energy beams, nuclear safety systems and geophysical flows are just a few examples where solidification and convection occur together. These processes are interactive: flow affects the distribution of heat and species, and hence solidification, while solidification, giving rise to crusting for example, can radically alter the flow field.

Research into such interactive processes continues at a high level driven by the manifold practical applications. Recent progress on the microscale processes involved in the study of crystal structures has been good, with notable successes in phase-field modelling. In contrast, progress on the meso- and macroscale has been fragmented despite the undiminished demand for a better understanding. Thus it is timely to bring together scientific workers to review progress and discuss possible lines of attack in this important area of fundamental research.

409 *Dynamics and long-term behaviour of railway vehicles, track and substructure.*

Prof. K.Popp, Institute of Mechanics, University of Hannover,
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Prof. Roman Bogacz, Warsaw; Prof. Hans True, Lyngby
6 - 9 March, 2000. Hannover, Germany

Railway systems are operated successfully all over Europe. In recent years the travelling speed of intercity transport has increased steadily. This leads to strong dynamic interactions between railway vehicles, track and subgrade and sometimes results in long term damage to some components such as deformed wheels or pulverised ballast. Thus new insight into short-time dynamics and the corresponding long-term behaviour of the entire system is necessary. Research should be focused on the most important system components and their interactions. Solutions must be

found mainly for the medium frequency range 50 – 500 Hz.

Topics will include the dynamics of high speed vehicles and bogies, generation and transmission of vibration in the medium frequency range, damage models; modelling of the track including rails, rail pads, sleepers and ballast or concrete, and interaction with substructures; new theories for rolling contact including temperature effects, traction and braking, wear and corrugations; dynamic interaction of vehicle, track and substructure, coupling of short time dynamics and long-term behaviour.

410 *Cancelled*

411 *3C stereo and holographic PIV, application to turbulence measurements*
Doc. M. Trinité, CORIA-UMR 6614, Université et INSA de Rouen,
76821 Mont Saint Aignan Cedex, France.

E-mail: trinite@coria.fr

Dr. Jürgen Kompenhans, DLR Göttingen;

Prof. Michel Stanislas, CNRS Villeneuve d'Ascq

29 – 31 May 2000, Rouen, France. *Note the change of date.*

Particle Image Velocimetry (PIV) is a unique non-intrusive optical method able to capture whole velocity fields in a very short time interval. It is now recognised as especially suited to the study of unsteady flows and coherent structures. Recent developments in lasers and CAD cameras allow the use of PIV for turbulence measurements. In addition development of 3C, 2D (stereoscopy) or 3C, 3D (holography) makes possible the determination of spatial properties in both isotropic and anisotropic flows.

On the other hand new numerical methods such as DNS and LES allow comparison with PIV for test flows while PIV may be used to complement DNS and LES for complex flow studies. This opens a new field of investigation.

The topics proposed for the meeting are: Stereoscopic PIV; Holographic PIV; limits of resolution and accuracy; application to isotropic and non-isotropic turbulence; comparison with DNS/LES and time-resolved 3D PIV.

412 *LES of complex transitional and turbulent flows*

Prof. Dr.-Ing. R. Friedrich, Lehrstuhl für Fluidmechanik, TU München,

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Prof. Dr. W. Rodi, Karlsruhe

5 – 6 October 2000, TU Munich, Germany.

The Colloquium will discuss recent developments in the field of large-eddy-simulation of complex transitional and turbulent flows. The complexity may be due to flow geometry or to the underlying physical mechanisms. Physical complexity is found in transitional and chemically reacting flows, in flows with body forces (e.g. buoyant, rotating, magneto-hydrodynamic flows etc.) and in two-phase flows, as

An Aural History of Euromech (Part 2)

Dr. Fons Alkemade

(Part 1 of this article appeared in Newsletter 13)

The foundation of EUROMECH was *not* related to any concern that 'European' mechanics would become dominated by the American influence. "What we did think, was that the Americans could learn something from EUROMECH. And many Americans came to our meetings because they liked the character of them." American participants were always welcome. But simply due to things like travelling expenses and distances, the number of non-European scientists has always been much less." Batchelor doesn't believe there are differences in the scientific topics treated in Europe and areas like the USA¹.

The majority of the participants have always been European. "It has worked out that way," Batchelor remarks. "I think that some people in EUROMECH tried to meet such a target. But others, myself included, saw that it was happening naturally anyway."

"As for the locations of the Colloquia, there were some minimum requirements. If the Chairman of the organizing committee seemed not likely to be able to provide these, then the EUROMECH committee would suggest an alternative location. That was not at all easy work but everyone had the same general objective. I don't remember any cases where problems arose. Sometimes a Chairman went a bit too far in the direction of providing hospitality and we tended to discourage that because it set standards which not all organizers could meet. The EUROMECH Colloquia only needed a room for 40 to 50 people, an overhead projector, and facilities for making tea and coffee. Chairmen had sometimes to be gently discouraged. It was very difficult to do so, when they are being so hospitable and [had] invited 150 people or so."

An attempt was made to have the Colloquia divided proportionally among the various countries, but there never was a really even distribution. "It had to be behind-the-scenes planning."

A proposal for a Colloquium was a one-page document, suggesting a EUROMECH Colloquium on a certain subject. It mentioned the Chairman, the topic, the place, and a motivation. "The annual meetings of the EUROMECH Committee were partially devoted to discussing these proposals. Some were good, some were not and in some cases we were able to change the character of the meeting tactfully. We never passed a proposal without being reasonably confident that it could be a success. Sometimes we had to say: 'This proposal lacks this or that and we look forward to seeing it again next year in improved form'. In my time as a Chairman there were about 12 to 15 successful proposals

¹ In March 1991 Prof. Sidney Leibovich of Cornell University wrote to Prof. David Crignon, Chairman of EUROMECH: "I believe that we in the U.S. (or, thinking more broadly, the New World) would be well-served by a similar series of colloquia."

419 *Elastic waves in non-destructive testing*

Dr. Z. Prevorsek, Institute of Thermomechanics, Dolejskova 5,
182 00 Prague 8, The Czech Republic
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Prof. P. P. Delsanto, Politecnico di Torino.

3 – 6 October 2000, Prague, the Czech Republic.

The purpose of this colloquium is to bring together scientists working in two apparently different research fields: elastodynamics and acousto-ultrasonic diagnostics of materials and structures. Few interactions exist between the two fields but many common problems exist which have yet to be solved. Progress in 2D and 3D computer simulations of elastic wave propagation in isotropic and anisotropic bounded solids can explain many experimentally observed wave effects, and considerably enhance testing reliability when using ultrasonic (US) and acoustic emission (AE) methods. Problems to be discussed include: AE signal deconvolution by solving the inverse elastodynamic problem, AE source location and description in anisotropic bodies, measurement of wave attenuation in complex structures, dispersion effects in thin plates and shells, US tomography reconstruction in complicated situations and US evaluation of elastic constants and internal stresses etc. The development of so-called modal AE in the last five years is an example of such new treatment of a traditional diagnostic method. Specialists in elastic propagation theory and computer simulation as well as those more focused on experiments and signal analysis are invited to present their results.

EUROMECH CONFERENCES in 2000

The conferences have full web pages, so that we are not printing previews here, but direct members to the appropriate internet addresses:

8th. European Turbulence Conference

June 27th. – 30th. 2000, Barcelona, Spain..
<http://bachelor.upc.es/etc8.html>

4th. EUROMECH Solid Mechanics Conference

26th. – 30th. June 2000, Metz, France
<http://www.lppmm.univ-metz.fr/euromech>

4th. EUROMECH Fluid Mechanics Conference

19th. – 23rd. November 2000, Eindhoven University of Technology,
The Netherlands
<http://www.efmc2000.tue.nl>

often found in industrial applications.

The discussion will cover fundamental aspects such as numerical and filtering techniques, *a-priori* testing new SGS models and the approximate wall treatment. Applications of the LES technique are also welcome.

413 *Stochastic dynamics of non-linear mechanical systems*

Prof. Mario Di Paola, Dipart. di Ingegneria Strutturale e Geotecnica,
Viale delle Scienze, 90128 Palermo, Italy.

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<http://www.diseg.unipa.it/euromech413.htm>

Prof. Franz Ziegler, Vienna.

12 – 14 June 2000, Palermo, Italy

Stochastic dynamics is a branch of mathematics concerned with the response evaluation of non-linear differential equations driven by white noise. In the last three decades many scientists, working in the area of mechanical systems subjected to physical environments such as wind or sea action, or earthquakes, take full advantage of the stochastic differential calculus for prediction of the response of mechanical systems under stochastic loading from a probabilistic point of view.

The aim of the meeting is to bring together scientists concerned with the evaluation of response in the various areas of mechanics and applied mathematicians dealing with the stochastic differential calculus. The principal topics will be: Closure methods for non-linear dynamical systems; exact solution of the Fokker-Planck equation; experimental verification of mechanical systems under stochastic loadings; Monte-Carlo simulations of non-linear systems; stochastic impact loadings on structures; probabilities of extremes in the response; elasto-plastic systems under white-noise excitation.

414 *Boundary element methods for soil-structure interaction*

Prof. W.S.Hall, School of Computing and Mathematics,

University of Teesside, Middlesbrough TS1 3BA, UK

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Prof. G.Oliveto, Catania

21 – 23 June 2000, University of Catania, Italy.

The objectives of the Colloquium are to give an impetus to this underdeveloped field of application of the BEM, to establish its current status and to identify areas where developments are needed or possible through presentation of current work and discussion between researchers.

Topics will include: Fundamental dynamic solutions for the half-space and layered half-space; periodic dynamical analyses by the BEM; time-domain formulations of the BEM for transient elastodynamics and for wave propagation; synthetic earthquake motions; soil-structure interaction with mechanical and geometric

nonlinearities; dissipation problems in soil-structure interaction; dynamical characteristics of soil-structure interacting systems; dynamical response to earthquakes of soil-structure interacting systems.

415 *Shear-flow control*

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Prof. Patrick Huerre, LADHYX, Palaiseau
24 – 26 July 2000, Berlin, Germany.

The colloquium will offer the opportunity to assess recent progress in the active and passive control of complex turbulent shear flows, and of 'new' methods of control of laminar-turbulent transition in shear flows, from experimental, theoretical and numerical points of view. Specific flows currently under study include classical configurations such as boundary layers, shear layers, wakes and jets as well as other geometries such as tip vortices behind aeroplanes. Important goals of flow manipulation are to reduce separation, improve mixing or reduce noise. The relationship between control theory and hydrodynamic instability concepts will also be of interest.

416 *Interaction of strong turbulence with free surfaces*

Dr. Maurizio Bricchini, Department of Environmental Engineering,
University of Genova, Via Montallegro 1, 16145 Genova, Italy.
E-mail: bricchini@diam.unige.it
Prof. D.H.Peregrine, Bristol
17 – 20 September 2000, Genova, Italy.

The smooth nature of liquid surfaces is disrupted by strong turbulence when surface waves break or turbulence from other sources is sufficiently strong. The objective of the colloquium is to bring together people working on varied aspects of this topic, both experimentally and theoretically, and concerned with both global properties and detail surface structures.

Topics include: wave breaking; splashing; break-up of free jets; self-aeration, spillways, open-channel flows; cusps and scars; surface jets and wake turbulence.

417 *Numerical modelling in damage mechanics*

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E-mail: jlc@onera.fr or euromech417@univ-troyes.fr
Prof. K.Saouani, GSKML/ASMIS, Troyes.
2 – 4 October 2000, Troyes, France.

Damage mechanics has now reached a high degree of maturity and is currently used for many different applications in connection with numerical simulation techniques. Many attempts have been made to build efficient numerical tools for the simulation of damage initiation and growth in mechanical structures, the objectives of the colloquium are to gather recent advances in the numerical and computational aspects of damage mechanics, and to stimulate current research and future challenges in the field. Presentations will emphasise variational formulations, numerical methods and their implementation, algorithmic strategies (contrasting explicit and implicit schemes, flow localisation problems and associated adaptive remeshing techniques etc.

Applications cover both the metal forming and manufacturing processes, providing damage prediction in bulk forming, sheet forming, blanking and orthogonal machining processes as well as the damage and failure analysis of structural components in service. Various materials such as metals, polymers, rubbers, rocks, soils and composites etc. will be considered.

418 *Fracture aspects in manufacturing*

Prof. R.V.Goldstein, Inst. for Problems in Mechanics, Russian Academy of Sciences, Prospekt Vernadskogo 101-1, 117526 Moscow, Russia.
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Prof. A.G.Atkins, Reading
25 – 29 September 2000, Moscow.

Fracture phenomena have both positive and negative roles in technology. Indeed many technological processes are based on using fracture to attain the fabrication aim. Among them are such technologies as cutting, wedging, drilling, comminution and grinding, etc. Material forming and material hardening (e.g. by thermal treatment or coating) however are often accompanied by fracture processes which degrade the product quality.

The colloquium is aimed at discussion of the problems in modelling, testing and optimisation of fracture processes in fracture-based technologies as well as the problems of modelling and prediction of fracture nucleation in material forming technologies. Particular emphasis will be placed on issues relating to the thermomechanical and chemomechanical effects in technological fracture (e.g. Rehbinder's effect in cutting, grinding and drilling, thermomechanical effects on defect formation in crystal growth etc.).