

President's Introduction

This is the first Newsletter under the auspices of the new team of officers of EUROMECH: H.H. Fernholz (President), D.G. Crighton (Vice President), M. Okrouhlik (Secretary General), and E. Hopfinger (Treasurer). It is my great pleasure to express the warmest appreciation of our predecessors, D.G. Crighton, B.B. Lundberg, and E.-A. Müller and recognise their most distinguished and successful service on behalf of EUROMECH.

David Crighton joined the EUROMECH Committee in 1984, succeeded G.K. Batchelor as Chairman in 1988 and became President of the EUROMECH Council in 1993. Bengt Lundberg became a member of the EUROMECH Committee in 1984, its Secretary in 1990 and Secretary General of the EUROMECH Council in 1993. Finally E.-A. Müller joined the EUROMECH Committee in 1991 and became Treasurer of the Council in 1993. They had to bear the brunt of the transition from the EUROMECH Committee, whose main task had been to organise EUROMECH Colloquia, to the EUROMECH Society with a much extended programme of colloquia, conferences and other activities in mechanics and, last but not least to serve a growing number of members.

The Council and the various Conference Committees need support, ideas and suggestions for improvements from our members all over Europe. We hope members will not hesitate to let us know their views about EUROMECH and its activities in the future.

Hans-Hermann Fernholz
President EUROMECH

Contents

2 S.Hammarling & N.J.Higham: *How to Prepare a Poster*
5 EUROMECH Officers' Addresses
6 EUROMECH Colloquia, 1997. Chairmen's Reports
20 EUROMECH Solid Mechanics Conference 3SMC, Report
21 Editor's Piece
22 EUROMECH Financial Matters and Membership



EUROPEAN JOURNAL OF MECHANICS
A-Solids and B-Fluids

Official media of publication for EUROMECH.

**A SPECIAL SUBSCRIPTION RATE INCLUDING
A 30% DISCOUNT IS AVAILABLE
TO ALL MEMBERS OF EUROMECH.**

SUBSCRIPTION RATES (2 series of 6 issues A/Solids - B/Fluids) - 1997 - Volume 16		EJMA	EJMB	EJMA + B
CEE	Normal price	2 550 FF	2 190 FF	4 260 FF
	EUROMECH members' price	1 785 FF	1 533 FF	2 982 FF
EXPORT	Normal price	2 815 FF	2 430 FF	4 720 FF
	EUROMECH members' price	1 970 FF	1 701 FF	3 304 FF

If you want to receive your own copy of **EJM/A** and / or **EJM/B**, fill in the form below and mail it today to:
Gauthier-Villars - 120, boulevard Saint-Germain - F - 75006 PARIS - FRANCE - Tel: + 33 1 40 46 62 00 - Fax: + 33 1 40 46 62 31

SUBSCRIPTION ORDER FORM

- ☐ Please enter my subscription to *EJM A-Solids* for 1997 at the rate of FF
☐ Please enter my subscription to *EJM B-Fluids* for 1997 at the rate of FF
☐ Please enter my subscription to *EJM A-Solids and B-Fluids* for 1997 at the rate of FF
☐ Payment by check enclosed to the order of SPES
☐ Please charge my credit card (VISA/EUROCARD/MASTERCARD)
N° [] [] [] [] [] [] [] [] Expiration date [] [] [] [] Signature _____
☐ Please send me a *pro forma* invoice
☐ Please send me a free sample copy of *EJM A-Solids* or ☐ *EJM B-Fluids*
☐ Please send me the Instructions to Authors of *EJM A-Solids*
☐ Please send me the Instructions to Authors of *EJM B-Fluids*
(Instructions to Authors are available on our Web site: <http://www.gauthier-villars.fr>)

Name

Address

You are ☐ Researcher ☐ Professor ☐ Librarian
☐ Student ☐ Other.....

Field of activity

Affiliation ☐ University ☐ Laboratory ☐ Industry

☐ Other _____

Gauthier-Villars abides by French law 78.17

gauthier-villars

How to Prepare a Poster

Sven Hammarling and Nicholas J. Higham
NAG Ltd, Oxford University of Manchester

Text reproduced with permission from SIAM NEWS, May 1996

Poster sessions are an increasingly important part of scientific conferences, and many of us are rather inexperienced in their preparation and presentation. Having been involved in organising and judging poster sessions, however, we have given some thought to what we consider to be desirable features of a poster. (We do not here address the publication of poster material in a conference proceedings.)

What is a Poster?

A poster is very different from a paper or a talk, and so different techniques need to be used in its preparation. In particular, a poster is *not* a conference paper, and simply pinning a paper to a poster board usually makes a very poor poster.

A poster board is typically 4 feet high and 6 feet wide, but the reverse orientation (tall and thin) is also seen. It is advisable to check beforehand on the size of the boards that will be available to you. A poster itself is a visual presentation comprising whatever the contributor wishes to display on the poster board.

Usually, a poster is made up entirely of paper pinned or attached with Velcro strips to the board, but there is no reason why other visual aids should not be used. The pins or Velcro are usually provided with the board by the conference sponsors.

The purpose of a poster is to outline a piece of work in a form that is easily assimilated and stimulates interest and discussion. The ultimate aim is a fruitful exchange of ideas between the presenter and the people reading the poster, but you should not be disappointed if readers do not stop to chat – a properly prepared poster will at least have given useful information and food for thought.

A Poster Tells a Story

In preparing a poster, simplicity is the key. A typical reader may spend only a few minutes looking at the poster, so there should be a minimum of clutter and a maximum of pithy, informative statements and attractive, enlightening, graphics. A poster should tell a story. As always in a scientific presentation, the broad outline includes a statement of the problem, a description of the method of attack, a presentation of results, and then a summary of the work. But within that format, there is much scope for ingenuity. A question-and-answer format, for example, may be appropriate for part of the poster.

A poster should not contain a lot of details – the presenter can always communicate the fine points to interested participants. In particular, it is not a good idea to present proofs, except in brief outline, unless the proofs are the focus of the presentation. Keep in mind that the poster will be one of many in the

Treasurer's Report (1 January to 31 December 1997)

I. Income and Expenditure

Income	DM
Membership fees	30866.80
From Oxford Publication	598.36
Credit interest on deposit account	1304.27
EUROMECH Colloquia and Conferences	44188.96
	<u>76958.39</u>

Expenditure

Bank transfer charges (Treasurer)	99.00
Stamps/office supplies (Treasurer)	1665.35
Travelling costs (Eastern country council members to meeting)	1486.73
Administrative expenses (General Secretary)*	10000.00
Administrative expenses (President)*	3493.47
Support for young participants in EUROMECH colloquia	3600.00
Administrative costs for Newsletter 8 (Dr. Finley)	2633.95
Administrative costs for Newsletters 1 – 7	13999.99
Dr. Alkemade – Booklet on EUROMECH history	1482.00
Into reserve	38497.90
	<u>76958.39</u>

*Council decision at Liverpool meeting

II. Balance Sheet

Balance	01/01/97 Treasurer	57851.50
	Regional Treasurer (UK)	2895.11
	Regional Treasurer (Poland)	3035.65
	Transfer from 1997 activities	<u>38497.90</u>
		<u>102280.16</u>
Balance	31/12/97 Treasurer	99244.51
	Regional Treasurer (UK)	0.00
	Regional treasurer (Poland)	<u>3035.65</u>
		<u>102280.16</u>

Financial Matters

EUROMECH Accounts:

The present EUROMECH account is

EUROMECH – E.J.Hopfinger
Banque Populaire DA, Grenoble University Campus Agency
Bank code Agency Account number Key
12807 00015 01519068782 20

Payment is possible by bank transfer, credit cards (Visa, Master, Eurocard) and cheques.

The account in Göttingen will remain open, but all new payments should be made to the French account.

Membership number:

Each EUROMECH member will be given a membership number which replaces the membership card (a card can be issued on special request). This number should be used as membership identification when participating in EUROMECH activities (colloquia, conferences).

EUROMECH Membership, March 1998

Albania	2	Germany	155	Republique du Bénin	1
Armenia	1	Greece	13	Rep. of Uzbekistan	1
Australia	4	Hungary	7	Romania	35
Austria	21	Iceland	1	Russia	107
Azerbaijan	2	India	2	Scotland	1
Belgium	15	Ireland	4	Serbia	3
Bulgaria	16	Israel	20	Slovak Republic	6
Brazil	1	Italy	147	Slovenia	7
Cameroun	1	Japan	13	Spain	12
Canada	9	Latvia	3	Sweden	31
China	8	Lithuania	3	Switzerland	16
Côte d'Ivoire	1	Mexico	2	Tunisia	1
Croatia	5	The Netherlands	33	Turkey	2
Czech Republic	30	New Zealand	1	United Kingdom	121
Denmark	5	Norway	5	Ukraine	26
Estonia	5	Poland	64	U.S.A.	40
Finland	1	Portugal	7	Yugoslavia	13
France	216	Rep. of Macedonia	3		
				Total	1249

(The editor has resisted the temptation to transfer the Scottish Nationalist to the UK.)

exhibition area: You need to make sure that it will capture and hold the reader's attention.

The poster should begin with a definition of the problem, together with a concise statement of the motivation for the work. It is not necessary to write in complete sentences; sentence fragments may be easier to comprehend. Bulleted lists are effective. An alternative is to break the text into small chunks – small units that are not necessarily paragraphs in the usual sense.

For presenting results, graphs and figures – easier to scan than the columns of figures in a table – are even more appropriate than in a paper. Legends should be minimal. A brief description of the implications of a graphic, placed just above or below it, is helpful. For ideas on graphic design a wide selection of books is available; either of the books by Tufte (1983, 1990) would be an especially good choice. Conclusions, again, should be brief, and they should leave the reader with a clear message to take away.

Designing your Poster

Suggestions on the physical design of your poster range from the obvious to the not so obvious. First, as we mentioned earlier, it is definitely unacceptable to post a copy of a paper!

A poster is usually formed from separate sheets of letter paper: 8 x 11 inches (U.S.) or A4 (Europe). The number of pages should be minimised – for these sizes at suggested maximum is 15. But larger sheets, or even sheets of differing sizes within one poster can be also be very effective.

Whatever the size of the sheets, the typeface chosen should be considerably larger than standard, because not all readers will have perfect eyesight, and because the crowd of readers round a popular poster may be several deep, the type should be easily readable by a person standing several feet away. In particular, the title of the poster and the author's name should be large and prominent. If it is not convenient to print at the desired type size, pages can be magnified on a photocopier.

Good use can be made of colour, both to provide a more interesting image and for colour coding of the text. A coloured backing card for each sheet can be effective. For added interest, try including an appropriate cartoon, photograph or quotation. There is plenty of scope for creativity.

If the sheets are arranged as a matrix, two layouts are possible: horizontal (reading across the rows) and vertical (reading down the columns). While the horizontal ordering is perhaps more natural, it has the disadvantage of requiring the reader to move to and fro along the poster; if there are many readers, congestion can result. A vertical ordering is therefore preferable, although other possibilities should be considered as well. If you are comparing three methods, for example, you could display them in parallel form, in three rows or columns, perhaps as "a display within a display". Consider the possibility of arranging the

poster to represent some feature of the problem, such as a particular sparsity structure of a matrix. If there is any doubt about the order in which the sheets should be read, guide the reader by numbering the sheets clearly, or linking them with arrows.

Think carefully about the use of the poster board. One extreme is to spread the sheets out to make full use of the board – taking care to position them at a height at which they can be read by both the short and the tall. If there are only a few sheets, it may be better to concentrate them in a small area, where a reader can proceed from beginning to end while standing in one position.

Images of some of the posters presented at the IMA Conference on Linear Algebra and its Applications, held at the University of Manchester in July 1995, are available on the World Wide Web at the URL <http://www.ma.man.ac.uk/MCCM/aa95.html>. Several examples of layout and further discussion are given by Matthews (1990).

Transportation and the Poster Session

Transporting a poster can be a problem if it contains large sheets of paper.

Rolling the paper into a cylinder is the most common system. You will usually be allotted plenty of time to set up the poster, so it may be easiest to bring it in pieces, to be assembled on site (but be sure to work out the layout beforehand – and bring a diagram!). If the work presented in the poster has been described in more detail in a paper, consider making the paper available as a handout at the poster session.

Once the session starts, stand near the poster but not in a position which obscures it from view. Be prepared to answer the questions that a good poster will inevitably generate. But keep in mind the advice of one expert: "A presenting author at a poster session should behave like a waiter in a first class restaurant, who is there when needed but does not aggravate the guests by interrupting conversation every ten minutes to inquire whether they are enjoying the food" (Anholt, 1994).

A Word to Conference Organisers

If we wish presenters to take poster sessions seriously, and if we want the submission of a poster to be seen as a viable alternative to giving a talk, then it behaves conference organisers not to treat the presenters as second-class citizens. This means making poster sessions an integral part of the conference programme, providing appropriate facilities for the setting up and presentation of posters, and encouraging conference participants to attend the poster sessions. Proper time should be allowed in the programme for the poster sessions; adequate boards, fasteners and space should be provided, and the poster rooms should not be remote from the rest of the conference. If the dining area is large enough, consider having some posters there – a good audience is assured! A poster prize is also worthy of consideration.

With one exception, the plenary lectures, together with the opening lecture, were published in a special issue of the *European Journal of Mechanics A/Solids* 16 pp 1–150, 1997.

There were 582 abstracts received of which 341 were selected for presentation. Of these 25 were not delivered, the final 316 being presented in 9 parallel sequences.

A total of 393 scientists attended the conference, with 60 accompanying members.

The free social programme consisted of a reception with buffet in the Town Hall by courtesy of the Mayor of Stockholm, a cruise in the archipelago, courtesy of MTS, and a banquet on the campus. These events were very well attended, with about 400 present on each occasion. Other events included a sightseeing tour of the city by bus, a full day trip by boat to the Viking town of Birka, a visit to the Vasa Museum with the sunken warship and a guided tour of a porcelain museum, these outings also being well attended.

It was felt that 3ESMC was successful both from a scientific and a social point of view. The number of participants was high and the contributed lectures were of an impressive scientific quality. The lectures were well attended, and the discussions were lively.

Following the EUROMECH tradition, substantial efforts were made to make it financially possible for Eastern European members to attend. Over 100 applications for assistance were received. After a careful scientific review of the abstracts, 44 were selected for support in attending the conference. For various reasons, not all entirely respectable, the number finally giving presentations was 35. In general, their standard was very high.

The next conference in this series, the 4th. EUROMECH Solid Mechanics Conference, will be held in Metz, France, on June 26th–30th., 2000, with Professor Potter-Ferry as Chairman of the Local Organising Committee.

Editor's Piece

The next issue should appear in July, and carry a full list of the 1999 Colloquia.

As yet I have no "leading article" for Newsletter 12, and would welcome a suitable piece, perhaps historical and sourced from the solids fraternity.

A membership fee form is enclosed, please note that it is back to back with a membership application form.

Nobody as yet has identified the Latin quotation I printed in the last issue. Surely, amongst so many distinguished scholars, someone should spot it – particularly all those with a good Gymnasium education!

PIF, May 1998.

3rd EUROMECH Solid Mechanics Conference

Chairmen N.Jones, ESMCC (Liverpool)
B.Storåkers, Local Committee (Stockholm)

The third EUROMECH Solid Mechanics Conference (JESMC), following earlier meetings in Munich (1991) and Genoa (1994), was held at the Royal Institute of Technology (KTH) in Stockholm on August 18th.-22nd., 1997. The ESMC Committee consisted of:

A.del Grosso, Genoa	J.Lemaitre, Paris	W.Schiehlen, Stuttgart
J.Englebrecht, Tallin	B.Lundberg, Uppsala	F.Sidorov, Lyon
N.Jones, Liverpool	G.Maier, Milan	L.Slepyan, Tel Aviv
M.Kleiber, Warsaw	F.Pfeiffer, Munich	B.Storåkers, Stockholm

The conference covered the entire field of theoretical, computational and experimental solid mechanics, including as general headings:

Analysis and mathematics	Mechatronic systems
Biomechanics	Micromechanics
Composite materials	Multibody systems
Computational mechanics	Nonlinear dynamics
Contact mechanics	Optimisation, identification and control
Continuum mechanics	Plates and shells
Damage mechanics	Soil and rock mechanics
Experimental mechanics	Stability
Fatigue	Structural mechanics
Forming and Processing	Theory of elasticity
Fracture mechanics	Vibrations, dynamics of machines
Mechanics of materials	Wave propagation

The Royal Institute (KTH) was in charge of local arrangements, through a committee consisting of the following members:

<i>From the KTH:</i>	Peter Gudmundson	Mårten Olsson
Per-Ulf Allmo	Per-Lennart Larsson	Bertil Storåkers,
Anders Eriksson	Martin Lesser	Bengt Sundström
Maria Gillberg	Fred Nilsson	Sören Östlund

supported by

Bo Häggblad, ABB Corporate Research, Västerås and
Bengt Lundberg, University of Uppsala.

The participants were welcomed by Professor J.Carlsson, President of KTH and addressed by Professor N.Jones, Chairman of the Conference Committee. Subsequently the EUROMECH Solid Mechanics Lecture "studies of Micromechanics of Materials" was given by Professor V.Tvergaard (Technical University of Denmark). A further eight invited plenary lectures were given on the mornings and afternoons of the succeeding days.

Our experience suggests that the effort of encouraging poster presenters is rewarded with posters of sound technical content and pleasing visual effect.

References

- Anholt, Robert R.H., (1994). *Dazzle'em with style: The art of oral scientific presentation*, W.H.Freeman, New York.
- Matthews, Diane L., (1990). The scientific poster: Guidelines for effective visual communication, , 37 (3) 225-232.
- Tufte, Edward R., (1983). *The visual display of quantitative information*, Graphics Press, Cheshire, Connecticut.
- Tufte, Edward R., (1990). *Envisioning information*, Graphics Press, Cheshire, Connecticut.

Addresses for EUROMECH Officers

- President:** Professor Dr.-Ing. Hans H. Fernholz,
Hermann-Föttinger-Institut, Technische Universität Berlin,
Straße des 17. Juni 135, D - 10623 Berlin, Germany.
e-mail: fernholz@hobop.tu-berlin.de
Tel: + 49 30 3142 3359. Fax: + 49 30 3142 1101.
- Vice-President:** Professor David.G.Crighton,
Department of Applied Mathematics and Theoretical Physics (DAMTP),
University of Cambridge, Silver Street, Cambridge CB3 9EW, England.
e-mail: dgc@damtp.cam.ac.uk
Tel: + 44 1223 337 860. Fax: + 44 1223 337 918.
- Secretary-General:** Doc. Ing. Miloslav Okrouhlik, CSc.,
Head of Mechanics & Solids Department, Institute of Thermomechanics,
Academy of Sciences of the Czech Republic, Dolejškova 5, 182 00 Prague 8.
e-mail: ok@bivoj.it.cas.cz
Tel.: + 42 2 688 5158. Fax: + 42 2 858 4695
- Treasurer:** Professor Emil.J. Hopfinger,
LEGIMG, B.P. 53, 38041 Grenoble Cedex 09, France.
e-mail: emil.hopfinger@hmg.inpg.fr
Tel.: + 33 476 82 50 43. Fax: +33 476 82 52 71.
- Journal Editor:** Dr. John Finley
Department of Aeronautics,
Imperial College of Science, Technology and Medicine,
Prince Consort Road, London SW7 2BY, UK.
e-mail: j.finley@ae.ic.ac.uk
Tel.: +44 171 594 5063. Fax: + 44 171 584 8120
- Internet Web-site**
<http://www.it.cas.cz/euromech>

EUROMECH Colloquium 357

Material Identification Using Mixed Numerical/Experimental Methods

Chairmen: H.Sol (Brussels) and CW.J.Oomens (Eindhoven)

The 357th Colloquium took place in the authentic monastery *Rolduc*, Kerkrade, Holland, from April 7th–9th, 1997. There were 39 participants from 12 countries. There were three invited lectures and about 20 other spoken contributions. The relatively new domain of Material Identification Using Mixed Numerical/Experimental Methods (MMM) provides an increasingly powerful way to determine the values of unknown parameters in a numerical model by observations made on real physical test structures. MMM try to update parameters in the numerical model by matching them to experimental observations. This combination has created an extra degree of freedom for the design of experiments and has led to new approaches for material characterisation.

Five distinct sessions were devoted to the topics:

- (1) Composite materials; (2) Elasto-plasticity; (3) Concrete and soil;
- (4) Biological materials and (5) Damage.

In the evening of the second day a poster session was arranged to serve as a starting point for discussions by those participants who, due to time limitations, were unable to give a formal spoken presentation.

A discussion on the last day led to the creation of a permanent MMM research group, with 16 participants offering active co-operation. The main goals of the group are to offer a permanent discussion platform, to write lecture notes on important common topics and to organise workshops in the future.

The common important scientific conclusion of the Colloquium was that if MMM is to be successful, it is necessary to have a very accurate numerical model of the experimental set-up, and a very detailed account of the experimental observations. The mathematics required for the updating task were considered as of lesser importance.

The informal atmosphere and limited number of participants led to very animated and fruitful discussions. The opportunity to continue discussions after dinner until midnight offered by the cloistered accommodation was much valued – in fact no one could escape because of the isolation of the monastery.

EUROMECH Colloquium 372

Reliability in Nonlinear Structural Mechanics

Chairmen: J-C.Mitteau (Clermont-Ferrand) and O.Ditlevsen (Lyngby)

EUROMECH 372 took place at the Institut Français de Mécanique Avancée, Clermont-Ferrand on October 21st–24th, 1997. There were 41 participants from 15 countries.

There were two special lectures. One, by O.Ditlevsen, concerned random field modelling of pressures on the wall of a circular concrete silo and the stochastic modelling of the pressure as the silo was emptied. The other, by V.V.Bolotin, discussed earthquake engineering, stressing the practical requirements of engineers and the need to improve mechanical models.

About half of the presentations dealt with reliability in mechanics. This subject is under rapid development with contributors all over the world. practical applications are of importance since the total cost of natural disasters (earthquakes, typhoons, hurricanes etc.) is growing rapidly. Knowledge of geophysical conditions in earthquakes is still inadequate. It should be possible to make better use of computers in computations of probability with higher efficiency in methodologies.

Techniques in static structural reliability are still a very much developing field. It is necessary to use highly nonlinear mechanics as in the consideration of buckling or localisation phenomena in plastic deformations.

There were vigorous discussions in connection with each paper, and two more extended meetings at the end. The first was devoted to the competition between probabilistic and non-probabilistic approaches (convex and robustness, fuzzy logic). Since there are as yet few practical applications of these new methods, it would appear that no final judgement is necessary yet. The other discussion was centred on the difficulty of persuading practicing engineers to make use of these methods. They still do not believe in the application of probability in the design of structures.

supporting the process of designing complex multi-disciplinary systems. It has indeed been felt that a generic overall design methodology for these complex systems, covering appropriately the interactions between the system components, is still lacking. Therefore the organisers considered it useful to organise the discussions around the central theme of design methodology issues, both on the system and component level. The following topics were covered:

- Design methodologies of mechatronic systems
- Design software / design environments / modelling and simulation
- Control & measurement
- Actuators and sensors
- and System design

EUROMECH Colloquium 371

Efficient and Reliable Continuum Finite Elements for Linear and Nonlinear Analyses

**Chairmen: K. Schweizerhof (Karlsruhe), E. Ramm (Stuttgart)
and P. Wriggers (Darmstadt)**

EUROMECH 371 took place in Bad Herrenalb (near Karlsruhe) on September 17th.-19th., 1997 with 67 participants from 16⁺ countries. There were 8 sessions with 33 presentations. The subject matter was divided roughly into:

- Hybrid stress, enhanced strain elements
- Finite plastic deformations
- Shell problems
- Higher order approximations
- h-p and mesh-less computations
- Boundary element method
- Adaptive analysis
- Symbolic software for FE programs

The quality of all presentations was very high and enough time was left for vigorous exchange of scientific arguments. Discussion was further encouraged by the quality of the coffee in the wonderful conference centre. Prof. Taylor (Berkely) was unanimously recognised as "senior member" and expressed the general feeling that the meeting had been a great success.

Complete information including the transparencies used for the presentations is available on the web at

<http://www.uni-karlsruhe.de/~gs03/>
(Look for **EUROMECH 371** and then *Contributions*)

EUROMECH Colloquium 358

Mechanical Behaviour of Adhesive Joints; Analysis, Testing and Design

**Chairmen: S. Aivazzadeh (Nevers) R.D. Adams (Bristol)
A.H. Cardon (Brussels) and A. Rigolot (Paris)**

EUROMECH 358 took place on September 4th.-6th., 1997, at the Institut Supérieur de l'Automobile et des Transports, Nevers, France. There were 70 participants from 12 countries (one Scottish Nationalist holding out for separate listing).

Proceedings were divided into three main categories:

Analysis: presentation of papers discussing analytical and numerical methods used to analyse the stress state in adhesively bonded joints,

Testing: presentation of papers discussing some of the test techniques for characterisation of the mechanical properties of adhesives and bonded joints and

Design: presentation of papers dealing with design considerations and the durability of bonded joints.

Particularly notable were some papers addressing the mathematical foundation of adhesive joints, as also others relating to design tools presented during the Colloquium.

A full set of "Proceedings" has been prepared for this Colloquium.

EUROMECH Colloquium 359

Stability and Transition of Boundary-Layer Flows

Chairmen: S. Wagner (Stuttgart) and L. Kleiser (Zurich)

EUROMECH 359 took place in the Bildungszentrum Südwest, Telekom Stuttgart on March 10th.-13th., 1997, with 66 participants from 10 countries. The meeting was very well subscribed, and approximately one third of the abstracts submitted could not be accepted for presentation. Nearly all the European groups that are actively working on the investigation of laminar-turbulent transition were represented. Among the 38 papers, 21 focused on (windtunnel) experiments, 10 on stability theories (including PSE) and 7 relying on Direct Numerical Simulations (DNS). Theoretical/numerical and experimental studies were thus well balanced with many presentations bringing out the complementary nature of the two approaches and demonstrating good quantitative agreement.

Classical linear stability theory can be used successfully to solve a variety of difficult problems, as, for instance, the response of a boundary layer to localised vibrations at the wall. On the other hand, using the same theory in the so-called e^N method (i.e. for predicting the location of transition) in three-dimensional boundary layers proved very error prone, being sensitive to the selection of integration paths or other parameters. Similar problems arise when using PSE while accurate DNS of receptivity is very time consuming.

The Colloquium was structured in 15 sections, with contributions normally limited to 30. There were 7 more extended lectures. The presentations were on a high scientific level, mainly presenting original and very recent work and gave rise to very lively discussions. Young people met with the most experienced researchers in the field, enjoying the pleasant facilities of the meeting site.

The first day was devoted to receptivity and stability analysis, followed in the evening by the formation of ERCOFTAC-SIG33 *Laminar-Turbulent Transition Mechanisms, Prediction and Control*. Objectives were presented and possible activities discussed. The second day covered swept-wing and compressible boundary layers followed by a party, while on the third day oblique transition and non-linear effects were considered, followed by a visit to the Mercedes-Benz Museum and a weinstube. Finally streamwise vortices, localised disturbances, separation bubbles and further non-linear effects were topics for the fourth day.

EUROMECH Colloquium 360

Mechanics of Sandwich Structures

Chairmen: A.Vautrin (Saint-Etienne) and A.Torres Marques (Porto)

EUROMECH 360 was organised by the Ecole des Mines de Saint-Etienne on May 13th.-15th., 1997. Sixteen countries were represented by 74 participants, of whom 36 were French. From 70 abstract submissions there were 5 keynote lectures, 28 oral presentations and 19 posters.

The colloquium addressed the latest advances in modelling sandwich structures. The wide variety of core and face materials introduced by major improvements in manufacturing processes offer new opportunities in the design and manufacture of structures with complex shapes and enhanced performance. Interest in sandwich structures continues to increase, especially for transport applications, and improved testing and modelling techniques are required to provide better founded guidelines for design.

The keynote lectures highlighted different acute theoretical or applied problems and served as introductions to the specialised oral sessions. The topics were:

EUROMECH Colloquium 369

Fluid-Structure Interaction in Acoustics

Chairmen: A.H.P. van der Burgh (Delft) and P.J.T. Filippi (Marseille)

EUROMECH 369 took place in Delft on September 23rd.-26th., 1997. There were 53 participants from 11 countries. The theme was concentrated on the interaction of sound and vibrating structures, related also to the weak and strong coupling between a gas and a liquid. Both theoretical and experimental studies were included under the following headings:

Experimental studies	Structural excitation by fluids
Inverse problems and active control	Numerical models and methods
Non-linear fluid-structure interaction	Analytical concepts and methods

Five general lectures were presented as well as ten invited lectures. A number of leading researchers were present; this had a significant impact on the level of both the presentations and the discussion. Many participants were impressed by this level and by the possibility of forming personal contacts with colleagues.

EUROMECH Colloquium 370

Synthesis of Mechatronic Systems

Chairmen: M.Hiller (Duisburg) and H.van Brussel (Leuven)

EUROMECH 370 took place at Duisburg on September 15th.-17th., 1997 with 34 participants from 11 countries.

Computer science and electronics are increasingly influencing traditional disciplines such as mechanical and electrical engineering. Hence in future the design of new technical products will only be possible through the involvement of specialists from various overlapping fields in every phase of development. This is the basic idea of *mechatronics*, which has emerged as a new paradigm for machine design and has become one of the cornerstones of *concurrent engineering*. Mechatronics advocates a *systems-thinking approach to intelligent-machine design* by synergetically combining the previously mentioned disciplines in an integrated manner during the design cycle. The ultimate goal of mechatronics is to achieve a system performance superior to what can be achieved by traditional sequential design, characterised by a certain degree of intelligence.

The meeting brought together scientists and engineers, active in the field of mechatronics, to discuss recent evolutions and methodologies underlying and

EUROMECH Colloquium 368

Biomechanics of Hearing

Chairmen: W.Schielen and A.Eiber (Stuttgart)

EUROMECH 368 took place on the Vaihingen campus of the University of Stuttgart on September 10th.-12th., 1997. There were 50 participants from 11 countries. The meeting formed a bridge between acoustical and medical scientists coming from surgery, hearing research and audiology on the one hand, and mechanical and control engineers on the other. The main topics were modern measuring techniques, modelling and simulation, and microsurgery with its application to the hearing organs.

There were three invited plenary lectures while 31 contributions were presented in 12 sessions devoted to the following topics:

- Description of the hearing process with appropriate models using finite elements
- Multibody system and continuous system modelling for the outer, middle and inner human ear respectively.
- Parameter identification of the models using physicians' knowledge and clinical observations.
- Audiological measurements concerning specific investigations such as impedances, pressure and forces as well as transfer functions.
- Detection of vibrations and imaging of motion patterns by laser or optoelectronic techniques.
- Simulations of the dynamic behaviour of the different parts, including the spatial vibrations of the middle ear ossicles.
- Transfer of specific sound events to the nerves of the inner ear.
- Simulations of the dynamic behaviour of the entire hearing for normal and pathological situations.
- Reconstructed hearing with passive and active implants.

Most contributions were devoted to the description and investigation of the dynamic behaviour of the middle and inner ear from an experimental and theoretical point of view. The main problems were the formulation of appropriate models, the identification of parameters and the validation of models by comparison with measurement. For the application of the results in clinical practice the optimal design and practical use of passive and active prostheses was widely discussed. Simulations with the models made possible a better understanding and interpretation of clinical observations during surgery and diagnosis via oto-acoustic emissions and multi-frequency tympanometry.

It is hoped that a number of the papers will be published by Karger in "*Audiology & Neuro-Otology*" in 1998.

Classification of sandwich structures,
Development of advanced sandwich structures for naval vessels,
Damage tolerance of aeronautical sandwich structures,
Numerical simulation of the crash behaviour of sandwich structures with fibre-reinforced polymer faces
and Numerical models and optimisation of sandwich structures.

Among the principal conclusions of the conference discussions were:

- Characterisation of the mechanical properties of sandwich panels should be based on hybrid identification approaches incorporating both numerical modelling and testing.
- Standard tests are not adequate, and need to be supplemented by testing under complex loading. In particular, analysis of buckling behaviour calls for better controlled boundary conditions and optical metrology techniques.
- Models should take account of the microstructure of core materials. The effect of the shape of core cells should be known to assist in the design of components. Homogenisation methods should be supported.
- It is difficult to obtain adequate information on core properties. Advanced experimental techniques are required to find the dynamic (energy absorption) properties and the ultimate strength over a frequency range.
- The effects of environmental conditions on the structure must be considered for optimised structures. There is a lack of time-temperature-moisture information limiting applications in design.
- Local buckling should be further investigated both numerically and experimentally. Special attention is to be paid to boundary conditions. Defects must be considered for buckling loads and post-buckling behaviour.
- Research on joint and insert analysis should be stimulated for design guidelines. This is vital for crashworthiness in transport applications.
- The use of new types of reinforcement is strongly bound to the capability of modelling the manufacturing process.
- Special finite elements have been developed to predict large displacements and assess transverse stresses. Reliable analytical and numerical reference solutions are required to assess the efficiency of these tools particularly in regions subjected to stress gradients.
- Analytical solutions exist under better controlled assumptions than numerical ones. A round-robin test is in hand to assess approaches to the bending of sandwich beams.

A selection of full papers will be published by Kluwer in 1988.

EUROMECH Colloquium 361

Active Control of Turbulent Shear Flow

Chairmen: H.H.Fernholz and H.E.Fiedler (Berlin)

Colloquium 361 was held at the Technische Universität Berlin on 17th–19th. March 1997. There were 63 participants from 14 countries. The Colloquium was the second in a projected continuing series on the control of turbulent shear flows which started with EUROMECH 328 in 1994.

The emphasis was on the active control of free and wall-bounded turbulent shear flows. Submissions on transition control and drag reduction were not encouraged. This reduced the scope of the meeting somewhat, showing that research in this field in Europe is still on a restricted scale relative to that in the United States. (A meeting on "drag reduction" was organised by D.W.Bechert as a "back to back" conference of the Colloquium.)

The session topics were:

- Control of wakes
- Control of mixing layers, jets and wall jets
- Control of separating flows with fixed separation
- Receptivity and control
- Separating flows – lift control (x 2)
- General control mechanisms
- Drag and separation control of boundary layers (x 2)

The oral presentations were interesting throughout and well received by the audience. Discussions were lively, sometimes even passionate, and were conducted in an open and constructive manner. Scientific discussion continued during an "open house" at the Hermann-Föttinger-Institut, where participants had the chance to visit the laboratories.

New research activities

A working group "Control and Management of Turbulent Shear Flows" within the framework of COST F1 has been established and is coordinated by A.P.Dowling (Cambridge) and H.H.Fernholz (Berlin). This may serve to maintain contacts amongst researchers in the field between Colloquia.

Dr.J.F.Morrison (Imperial, London) suggested the formation of an Interest Group on "Fluid Dynamics and MEMS" (Micro-Electro Mechanical Systems) and asked interested participants to join. This could be incorporated in COST F1 and form another subgroup if the Management Committee of COST F1 were to agree at the next meeting in October 1997.

(This has now happened. E-mail: j.morrison@ic.ac.uk)

experiments, with dynamics and wave propagation occupying the afternoon. The third day was taken up with micro mechanical aspects of porous medium theory, continuum mechanical modelling and further theory. On the last day the problems of drying and swelling were considered.

The goal of the meeting was to bring together scientists from the various fields concerned with porous medium theory, soil mechanics, geophysics, petroleum/energy engineering, chemical engineering and ceramics as well as biomechanics. Participants were requested to concentrate on recent findings concerning general concepts and special investigations in the theoretical as well as in the experimental field.

This goal was almost completely achieved, while the conference centre, located in a picturesque landscape in the Southern part of Essen provided the appropriate atmosphere for discussions between participants in stimulating surroundings. Informality was also much assisted by the social events – the welcome reception, the ice-breaker reception and the banquet.

A selection of the material presented will be published in a special edition of "Transport in Porous Media" in 1998.

EUROMECH Colloquium 367

Fluid Dynamics of Coating Processes

Chairmen: P.Bourgin (Strasbourg) and H-G.Wagner (Ludwigshaven)

EUROMECH 367 took place at Strasbourg on July 22nd–25th, 1997. There were 108 participants from 15 countries with a good 50/50 split between academe and industry. To avoid any misunderstanding with workers in Physics and Chemistry it was made very clear that the focus was on Fluid Dynamics.

There were five outstanding invited keynote lectures and nine sessions, none in parallel. The topics of the high quality presentations were:

- | | |
|---------------------------|------------------------|
| Mathematical modelling | Experimental studies |
| Computational studies | Evaporation and drying |
| Defects and instabilities | Spin coating |
| Spreading and levelling | Multi-layer coating |
| Air entrainment | |

In addition a poster session was organised, with a 5 minute presentation by each leading author. This display continued throughout the meeting. Much discussion took place during and after each session, encouraged by a wine tasting, a brewery visit and a visit to a wine-cellar.

EUROMECH Colloquium 365

Structural Damage Assessment Using Advanced Signal Processing Procedures

Chairmen: K. Worden (Sheffield) and F. Brancaloni (Pescara)

EUROMECH 365 follows an earlier meeting on this topic held at Pescara in 1995 (DAMAS 1). The Colloquium took place at Sheffield from June 30th. to July 2nd., 1997, with 37 full participants from 9 countries. Members of the local organising committee and students boosted the total to about 55. There were 41 presentations which have been collected as the published proceedings and a supplement.

The identification and quantification of damage in structures and machines is currently one of the most important areas in Engineering research. Effective early diagnosis of damage allows increased expectations of reliability and safety, allowing reductions in the cost of ownership through efficient maintenance.

Many of the recent advances in damage assessment and condition monitoring are the result of applying advanced signal processing procedures. In particular, ideas from the fields of multivariate statistics, pattern recognition and optimisation have proved exceedingly fruitful. The object of the meeting was to review recent developments and assess the state of the art. In this it was extremely successful, drawing together contributors from a variety of disciplines including Electrical, Civil, Control, Mechanical and Chemical Engineering. All contributions were refereed and the standard was uniformly high.

Plans are under way for a further DAMAS meeting in Ireland under the auspices of EUROMECH in 1999.

EUROMECH Colloquium 366

Porous Media: Theory and Experiment

**Chairmen: R.de Boer, S.J.Kowalski (Essen)
and K.Wilmanski (Poznan)**

EUROMECH 366 took place in the Bildungszentrum B.E.W at Essen-Heidhausen on June 22nd-26th., 1997. There were 43 participants from 9+ countries.

After an informal welcome reception on Sunday June the 22nd., each day was introduced by an invited keynote address.

The first day was concerned with transport phenomena, localisation and failure in porous media, and with continuum-mechanical modelling. This was followed on the second by a formulation of the effective stress principle and an assessment of

EUROMECH Colloquium 362

Structural Damage and Failure under Intense Loading

Chairmen: S.R.Reid and S.T.S.Al-Hassani (UMIST, Manchester)

EUROMECH 362 was held from April 21st.-23rd., 1997, at the Manchester Conference Centre. There were 32 full delegates including three visiting from Brazil, Canada and South Africa, and several additional attendees for particular sessions (primarily postgraduates and assistants from UMIST). There were several contributions offered by researchers from the former Soviet Union.

Whilst a number of these were accepted for presentation, the authors were unable to participate due to lack of funds. Professor W.Johnson, FRS, FEEng attended the Colloquium as a special guest on the occasion of his 75th. birthday and participated in most of the sessions.

21 presentations were made in 8 sessions, each of which was linked to a specific area within the general scope of the Colloquium. Each delegate was allowed 40 minutes for their presentation and ensuing discussion. A booklet was issued which included the one page summaries provided by the authors.

The field covered is an important one which bears on a wide range of safety-related problems covering several engineering disciplines. These include the demolition of off-shore structures, the use of composite materials in the aerospace industry and in off-shore installations, nuclear power plant, impact energy absorption relating to automobiles, aircraft and ships and the fundamental aspects of the behaviour of a wide range of materials under high rate loading conditions. Current and continuing work on several generic and fundamental problems was presented by some of the leading researchers in this field.

The overwhelming consensus of comments received from the participants was that the meeting was a success at all levels. many commented on our success in creating the right atmosphere for a conference of this type and the facilities in the Manchester Conference centre were ideal for our purposes. The quality of the presentations was excellent and each paper generated lively discussion. There was an informal but focused atmosphere throughout each of the sessions and extensive interactions during the various breaks in the programme. several key areas associated with the modelling of some damage and deformation phenomena presented at the Colloquium, and the need for experimental verification of some of the analytical/computational procedures proposed were the focus of the final open session. It is clear that most of the participants made useful contacts with others working in the field of dynamic structural response which will no doubt lead to constructive collaboration in the future.

EUROMECH Colloquium 363

Mechanics of Laser Ablation

Chairmen: V.E.Nakoryakov, M.R.Predtechensky (Novosibirsk) and W.Marine (Marseille)

EUROMECH Colloquium 363 was held in Novosibirsk Akademgorodok on June 23rd-26th, 1997. There were 27 participants from 5 countries. The main aims of the meeting were to (1) bring to the attention of researchers concerned with fundamental gas and fluid dynamics the related aspects of pulsed laser ablation (PLA) and (2) to present the results of Siberian science to the attention of the European specialists.

The scientific activities were addressed in six sessions:

Opening session

Modelling and diagnostics of laser plasma expansion (x 2)

Fundamentals of laser-matter interaction (x 2)

Laser ablation deposition

The opening session contained an extended lecture by E.W.Kreutz (Aachen) on "Dynamics in Pulsed Laser deposition of Ceramics: Experimental, Theoretical and Numerical studies" and an account of work at the Institute of Thermophysics, Novosibirsk, by M.R.Predtechensky. Participants could then visit the related Institutes of Thermophysics, Nuclear Physics and Laser Physics.

Two days were largely dedicated to the mechanics of the laser plume. Different methods of obtaining information about PLA plume parameters were discussed, including the first presentation of a new method for probe measurements of the plasma-induced magnetic field. Numerical models were also presented with preference given to those from Novosibirsk and Stuttgart, while more traditional Monte-Carlo based studies of laser ablation promised interesting results.

In the sessions devoted to the mechanics of laser-matter interaction, laser ablation initiation and solid surface processing were discussed. The classical approach is well supported by experimental investigations while the mesoscopic approach had great potential for ablation studies. A variety of experimental studies was also presented both for ablation and for deposition.

The closing discussion indicated processes occurring near deposited substrates and the correlation between laser plume gas dynamics and chemical reactions in the plume as the least understood aspects of laser mechanics.

Three awards of 200DM were made to the three young scientists who had contributed the most interesting presentations: T.E.Ihina (Marseille), O.M.Tukhto and O.F.Bobrenok (both of Novosibirsk).

EUROMECH Colloquium 364

Dynamics and Statistics of Concentrated Vortices in Turbulent Flows

Chairmen: S.Le Dizés (Marseille) and K.Moffat (Cambridge)

EUROMECH 364 took place in a quiet hotel at Carry-le-Rouet (near Marseille) on June 23rd-27th, 1997, with 90 participants from 17 countries. The meeting had been widely publicised, with a special effort made to interest the main industrial groups. Unfortunately in the event only one industrial engineer attended.

The Colloquium was devoted to the study of turbulence from a dynamical point of view. The goal was to gather together experimentalists, numerical and theoretical physicists working on vortex dynamics and turbulence in order to stimulate the development of new ideas and methods in turbulence modelling. Several new results were presented and there were numerous animated and rewarding discussions between the participants.

All the themes addressed were connected to the general issue of finding the role of concentrated vortices in turbulent and transitional flows. In particular:

- Experimental and numerical evidence for localised structures in turbulent flows. What is the geometrical nature of localised structures? Are these structures described by known vortex models such as the Burgers vortex?
- Statistical properties of turbulence: theoretical predictions, numerical and experimental results. What is the dependence of scaling laws on localised structures?
- Vortex dynamics: asymptotic analysis, numerical simulation and experiment. Studies focused on simple configurations for understanding of the interaction of a vortex with another vortex, a wall, a free surface etc.
- Vortex stability analysis: how and why are vortices destabilised by the external field?
- Complex flows (boundary layers, shear flows, wakes and stratified flows). Several presentations concerned the understanding of the transition to turbulence based on vortex dynamics and vortex stability results.

About a quarter of the presentations have been selected for publication in a special issue of the European Journal of Mechanics B/Fluids dedicated to the meeting.

Significant support for young researchers and those from "less favoured regions" was received in the form of a grant from the EC.