

EUROMECH

EUROPEAN MECHANICS SOCIETY

Final Report

Please send this report to the Secretary-General of EUROMECH, within one month after the Colloquium.

EUROMECH Colloquium No: 345

Title: The Future of Structural Optimization

Dates and location: 1-3 April 1996, University of Liverpool, UK

Chairman: Professor A B Templeman

University of Liverpool

Co-Chairman: Dr J Blachut

Is there need of another Colloquium on the same or a related subject? Which year? Perhaps 1998/99

Full registration fee: £178 (reduced to £150 for EUROMECH members)

What other funding was obtained? None

What were the participants offered? --

Number of members of EUROMECH (reduced registration fee): 10

Number of non-members of EUROMECH (full registration fee): 41

Number of participants from each country:

Austria	_____	Germany	<u>12</u>	Romania	_____
Belgium	<u>1</u>	Great Britain	<u>12</u>	Russia	_____
Byelorussia	_____	Greece	_____	Slovakia	_____
Bosnia	_____	Hungary	_____	Slovenia	_____
Bulgaria	_____	Ireland	_____	Spain	_____
Croatia	<u>2</u>	Italy	<u>2</u>	Sweden	_____
Czech Republic	_____	Latvia	_____	Switzerland	_____
Denmark	<u>3</u>	Lithuania	_____	Ukraine	_____
Estonia	<u>1</u>	Netherlands	<u>1</u>	Yugoslavia	_____
Finland	_____	Norway	_____	Others	<u>8</u>
France	_____	Poland	<u>6</u>	Total	<u>51</u>
Georgia	_____	Portugal	<u>3</u>		

Please turn





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EUROMECH COLLOQUIUM 345

The Future of Structural Optimization

Report for EUROMECH Council

The Colloquium was held at Derby and Rathbone Halls, University of Liverpool, UK during 1-3 April 1996. A total of 51 people participated from 14 countries. An analysis of participants by country is as follows:

United Kingdom	12
Germany	12
Poland	6
USA	5
Denmark	3
Portugal	3
Italy	2
Croatia	2
Australia	1
Belgium	1
Estonia	1
Holland	1
Israel	1
South Africa	1

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51

The Registration Fee for the 3-day colloquium was £150 and included all meals and refreshments (except breakfast). A surcharge of £28 on the Registration Fee was imposed for non-EUROMECH members to cover the required levy. 41 participants voluntarily declared that they were not members of EUROMECH and paid the levy. A total of £1148 has been paid to the Treasurer of EUROMECH as the levy. Accommodation costs were separate. Most participants stayed on site in University student accommodation at a cost of £18.60 per night for bed and breakfast. A few participants chose to stay in a central Liverpool hotel at a cost of £37.50 per night for bed and breakfast. The cost of taxis between the hotel and colloquium was met by the organisers from the Registration Fees.

The booklet enclosed was provided to all participants on arrival and contained details of the local

arrangements, timetable of sessions, abstracts of papers and list of participants.

The scientific programme was very full. The co-Chairmen had expected that accepting 50 papers for presentation at an early stage of planning the colloquium would result in approximately 35 presentations at the colloquium itself, allowing for cancellations and drop-outs. In fact there was almost no cancellations and 47 presentations were made. In order to fit in all presentations a time limit of 20 minutes was imposed on each speaker and plans for themed panel discussions had to be abandoned. Nevertheless, there were no complaints about this, all sessions were very well attended right through to the end of the colloquium and all participants joined in the spirit of the meeting.

Scientific aspects

Structural optimization has been the subject of research, development and application since the early 1960s. It has benefitted from a steady flow of new concepts and ideas over the past 30 years. In the past five years particularly there have emerged several very different new approaches to structural optimization problems, concepts such as genetic algorithms, global optimization, homotopy, topological and discrete optimization, which have each developed into separate strands of research. The purpose of the colloquium was to bring together experts in each of these strands and attempt to see the direction in which each of them is going. It was hoped that some general directions for research would emerge which would be stimulated by interactions and collaborations among the present separate research themes.

One of the main strands of research in recent years has been the use of sensitivity analysis and approximate optimization methods to improve structural design based upon implicit analysis (i.e. finite element-based optimization). Capabilities in this area have grown considerably to include simple topology optimization. One interesting possibility which was discussed at the colloquium was the replacement of the sensitivity analysis and approximate optimization elements of such packages by zeroth-order optimization methods. Genetic algorithms appear to be a good candidate for such replacement although other methods also have potential.

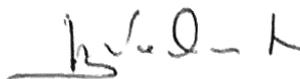
The view which emerged from the colloquium was that this is not an immediate possibility. The number of trial evaluations (FE analyses) needed by genetic algorithms and other probability-based methods is still far too large to compete with conventional sensitivity-based methods.

The colloquium demonstrated that structural optimization is still a vigorous and flourishing area of research and development after more than 30 years of work. There are now probably more different lines of research than ever in the past. Two or three main lines can be extrapolated into the future, but many of the interesting unconventional approaches currently in research could blossom and disrupt predictions of the future.



Professor A B Templeman

Co-Chairmen



Dr J Blachut

10 June 1996