

Please send this report to the Secretary of the European Mechanics Council, Professor Bengt Lundberg, School of Engineering, Uppsala University, Box 534, S-751 21 Uppsala, Sweden, within one month after the Colloquium.

General

EuroMech Colloquium No: 318

Title: Advanced Techniques in Structural Acoustics

Co-Chairmen: Dr. G.R. Wickham (Manchester), Dr. L.D. Abrahams (Keele)

Place and country: University of Manchester, England

Dates: 11th-15th April 1996

Finance

The conference fee £45 included reception on Monday evening, dinner on Wednesday evening, refreshment and small administrative costs.

Funding: No external funding.

Accommodation (type and cost): Bed & Breakfast for three nights Monday to Wednesday £54.
An extra £18 for any extra nights.

Meals: None provided other than the two indicated in conference fee.

Participation

Total number of participants: 44

Distribution of participants by country:

Code	Country	Number	Code	Country	Number
A	Austria		IRL	Ireland	
B	Belgium		LT	Latvia	
BG	Bulgaria		LV	Lithuania	
CH	Switzerland		N	Norway	
CS	Czechoslovakia		NL	Netherlands	1
D	Germany	2	P	Portugal	3
DK	Denmark		PL	Poland	
E	Spain		R	Romania	
EE	Estonia		S	Sweden	
F	France	1	SF	Finland	
GB	Great Britain	16	YU	Yugoslavia	
GR	Greece		CIS	CIS	9
H	Hungary		-	Others	12
I	Italy				

Is there need of another colloquium on the same subject? Which year? Yes, 1999.

Euromech 316: Final Report

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February 7, 1995

Euromech 316 was an informal workshop, of 3 days duration, organized to discuss the latest developments of analytical and numerical methods in structural acoustics. It was held ten years after Euromech 188, a similarly conceived meeting. Comparing the programmes of the two conferences, it is clear that although some fields of study are now well understood, a number of fundamental problems remain of interest. These are mentioned below, together with some new and exciting areas which have opened up in the last few years.

In the programme there were a total of 46 speakers/co-authors and participants from Western Europe (Great Britain, Portugal, France, Holland and Germany), the United States of America, and Russia. The meeting's success was in bringing together a small but international group of mathematicians and engineers with common aims and interests. The workshop was very informal, and much time was given over to open discussion and small group conversation.

The main themes of research to emerge throughout the meeting were:

1. Complex and real ray methods in fluid structural problems.
2. Scattering of acoustic waves by (i) rigid or elastic structures of complex shape and (ii) structures with discontinuities of material properties or slope.
3. Boundary integral equation methods in scattering by fluid loaded structures.
4. Effects of viscosity and inhomogeneities in sound propagation.
5. Rigorous Wiener-Hopf factorization methods.
6. Propagation and instability of waves on fluid loaded structures.
7. Acoustic streaming.
8. Scattering by ribbed panels and periodic structures.
9. Computation of solutions in the form of Fourier integrals

Whereas Euromech 188 was concerned with less well understood phenomenological aspects of structural acoustics, Euromech 316 was largely concerned with analytical and numerical methods for their quantification. The talk of Dr. Jane Lawrie(UK) was a good example where the meeting heard of new techniques for overcoming the classical technical difficulties associated with exact analytical calculations for diffraction of sound by geometrical and material discontinuities. Similarly, the meeting heard from Kleinman & Hsiao (USA) and Sorokin (Russia) of new boundary integral and field equation methods for numerical computations. Also, since Euromech 188, there has been considerable effort by Mathematicians in Darmstadt and Lisbon to provide a rigorous well-posed formulation of Wiener-Hopf problems arising in acoustics and the meeting was treated to presentations from the Portuguese school headed by Teixeira.

While the great majority of talks were mathematical in their bias some important new physical modelling questions were discussed in the papers of Crighton (UK) and Lucey (UK). The first concerned rough surface scattering, revisiting and reappraising the pioneering work of Biot, while the second discussed the topical question of structural acoustic instabilities in the presence of flow.

Finally, we mention a novel presentation by Dr. Maria Heckl (UK) which provided a dramatic demonstration of the advances in personal computing power since Euromech 188. Together with Firth (UK) she gave some computer-generated animations of diffraction by cracks in elastic solids.

There are signs that the area of structural acoustic calculations for complex configurations involving plates and shells such as that discussed by Norris (USA) will develop dramatically in the next few years. The relatively young subjects of exponential asymptotics and complex ray techniques as well as the classical complex analysis methods will almost certainly provide new insights and thus we conclude that it may well be appropriate to hold another Euromech colloquium in this area in say five years time.