

# 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: 348

Title: *Nonlinear Dynamics of Heterogeneous and Microstructured Solids*

Dates and location:

*May 22-26, 1996, Tallinn, Estonia*

Chairman:

*Prof. J. Engelbrecht (Estonia)*

Co-Chairman:

*Prof. G.A. Maugin (France)*

Is there need of another Colloquium on the same or a related subject? Which year? *yes, but not decided when.*

Full registration fee: *200 DEM regular, 100 DEM reduced for people from Eastern Europe, 60 DEM addition for nonmembers*

What other funding was obtained? *Mailing costs - Inst. of Cybernetics  
Rent for a reception - Acad. Sci.*

What were the participants offered?

*Booklet of abstracts, materials (folder, badges etc),  
techn. facilities of the colloquium hall (incl. rent),  
coffee-breaks, lunches, sightseeing tour, transport.*

Number of members of EUROMECH (<sup>regular</sup> reduced registration fee): 19

Number of non-members of EUROMECH (full registration fee): 12

Number of participants from each country:

Austria	_____	Germany	<u>6</u>	Romania	_____
Belgium	_____	Great Britain	_____	Russia	_____
Byelorussia	_____	Greece	_____	Slovakia	_____
Bosnia	_____	Hungary	<u>1</u>	Slovenia	_____
Bulgaria	_____	Ireland	_____	Spain	_____
Croatia	_____	Italy	<u>6</u>	Sweden	_____
Czech Republic	_____	Latvia	_____	Switzerland	_____
Denmark	<u>1</u>	Lithuania	_____	Ukraine	<u>4</u>
Estonia	<u>6</u>	Netherlands	_____	Yugoslavia	_____
Finland	_____	Norway	_____	Others	<u>3</u>
France	<u>2</u>	Poland	<u>2</u>	(US, Canada, Israel)	
Georgia	_____	Portugal	_____	Total	<u>31</u>

*+ students from Tallinn Techn. Univ.*

Please turn

*J. Engelbrecht  
18.06.96*

## Report on EUROMECH COLLOQUIUM 348

"Nonlinear Dynamics  
of  
Heterogeneous and Microstructured Solids"

May 22-26, 1996  
Tallinn, Estonia

A total of 28 contributions were effectively presented at EUROMECH 348 before an audience of some 40 participants from eleven different countries, and this in spite of a somewhat large deviation from usual travel routes and the unfortunate absence of Russian scientists in reason of some difficult administrative conditions. Contributors represented a blend of three sectors of activity of the field, mechanics *per se*, applied mathematicians, and condensed-matter physicists, with a natural emphasis on the first group. All lectures were granted equal time of presentation (30 minutes). An average of three to five questions and comments followed each presentation, what demonstrates a sustained interest from the audience and the constant high quality of the presentations. The organization and housing in a single place (Hotel Pirita, Tallinn) proved to be ideal for both scientific and social exchanges. This format and critical size are highly recommended to other EUROMECH colloquia.

As agreed upon in the original proposal, the contributions were essentially concerned with the mechanics and physics of media carrying a microstructure of various origins, and nonlinear effects related to - or interacting with - this aspect, provided the focus of the colloquium. Particular attention was paid to nonlinear waves of various types developing in some composite structures with an emphasis on pathological or exotic solutions (e.g., edge waves, "compactons", "peakons",...) or engineering applications (devices, smart materials). Some lectures eventually arrived at a chaotic behaviour, others dealt with modern techniques of simulation (cellular automata), or recently developed efficient theories such as that of configurational forces with applications to the progress of fronts, the numerical simulation of solitonic structures, or the study of the accuracy of finite-element schemes in solid mechanics. Finally, some lectures emphasized the still very interesting case of shock waves (in porous media or gas-saturated solids) while others naturally highlighted the essential role of a sound thermomechanical approach and some relevant mathematical techniques. Materials dealt with included solid deformable crystals with coupled (mechanical, magnetic, electric, heat) properties, composites of various types, and liquid crystals. The experimental side that was originally planned was unfortunately not represented in reason of the late cancellation of a few participants.

It is generally thought that the projected aims of the Colloquium were fulfilled to a high degree. The organizers are obviously conscious that not all aspects of such an extremely rich field of nonlinear science and structured materials could be examined in this short time. But a sufficient inclusive view seems to permeate from this small-sized colloquium. Furthermore, the pleasant environment and efficient organization provided by the scientific and technical personnel of the Institute of Cybernetics of the Estonian Academy of Science were essential in that success. With the financial support of an INTAS (EU) grant corresponding to the participation of eight active contributions to the Colloquium, it is projected to have a large selection of lectures printed in the form of refereed Notes presented to the *Proceedings of the Estonian Academy of Sciences* in a double issue to appear in 1997.

Given the success reached at EUROMECH 348 and the observed rapid development of the subject matter, the question is naturally raised of a repetition of a similar meeting in two or three years in the form of an EUROMECH colloquium or any other suitable form, in Tallinn or another place?

Gérard A. MAUGIN  
Paris, May 27, 1996

Appendices: - Book of abstracts  
- list and addresses of participants

*Gérard A. Maugin*  
Tallinn, May 31, 1996