

Please send this report to the Secretary of the European Mechanics Council, Professor Bengt Lundberg, Dept of Mechanical Engineering, Luleå University of Technology, S-951 87 Luleå, Sweden, one month after the Colloquium

General

Euromech Colloquium No: 282

Title: Microscopic and macroscopic plastic deformation instabilities

Chairmen: A. MOLINARI, Y. ESTRIN

Place and country: Université de METZ, FRANCE

Dates: 8-11 July 1991

Finance

The conference fee 500F included Booklet, 5 meals, 1 Banquet, coffee welcome party, Farewell party, Breaks *→ except for sponsored participants (15)*

Funding: European Community, Région Lorraine, Ministère de la Défense, CNRS, Ville de Metz, Université de Metz, Association Universitaire de Metz

Accommodation (type and cost): Everything free for sponsored participants, Hotel 235F per day.

Meals: included in the fee

Participation

Total number of participants: 69

Distribution of participants by country:

Code	Country	Number	Code	Country	Number
A	Austria	<u>1</u>	I	Italy	<u>3</u>
B	Belgium	<u> </u>	IRL	Ireland	<u> </u>
BG	Bulgaria	<u> </u>	N	Norway	<u> </u>
CH	Switzerland	<u> </u>	NL	Netherlands	<u>2</u>
CS	Czechoslovakia	<u>2</u>	P	Portugal	<u> </u>
D	Germany	<u>17</u>	PL	Poland	<u>3</u>
DK	Denmark	<u> </u>	R	Rumania	<u>1</u>
E	Spain	<u> </u>	S	Sweden	<u> </u>
F	France	<u>23</u>	SF	Finland	<u> </u>
GB	Great Britain	<u>1</u>	YU	Yugoslavia	<u> </u>
GR	Greece	<u>1</u>	SU	Soviet Union	<u>9</u>
H	Hungary	<u> </u>	-	Others	<u>6</u>

USA, Israel, Australia, Canada

Is there need of another colloquium on the same subject? Which year? yes 1993

EUROMECH 282

SCIENTIFIC REPORT

1) Scope of the colloquium

The object of Euromech 282 was to discuss the recent results in the field of plastic instabilities. These instabilities are often at the origin of the rupture of ductile materials.

2) Main scientific topics

Different scientific fields are concerned by plastic instabilities.

In material sciences, the global behavior of a material is often affected by microscopic instabilities (dislocation patterning, micro shear bands). At a macroscopic scale, plastic instabilities are appearing in engineering sciences (for exemple necking and shear banding in metal forming). Finally geophysicists are strongly interested by the stability of plastic flow in geomaterials. They observe instabilities at various scale (in "specimens" of the size of a coin, or of the size of a continent).

Two major axes are then appearing in Euromech 282 :

- The first axis relies on a scanning of the all field of plastic instabilities from the microscopic scale (but not below the dislocation scale), to the macroscopic scale (where some instabilities appear at the scale of tens of kilometers). An unitary point of view is obtained, with basic common ideas and methods of analysis.
- The second axis, consists to set a parallel between the works on various materials like :
 - metals
 - polymers
 - geomaterials

Here also common points of view and methods of analysis are emphasized.

The scientific program of the colloquium is constituted by eight sessions :

- 1) shear banding
- 2) Propagative instabilities
- 3) Thermomechanical instabilities, adiabatic shear bands

- 4) Dislocation self-organization
- 5) Single crystals
- 6) Non-metallic materials
- 7) Miscellaneous, general subjects
- 8) Metal forming

3) Conclusion

The colloquium Euromech 282, devoted to plastic instabilities, gathered together about 70 scientists, mainly from Europe. A strong scientific activity in this domain has been confirmed by the variety of applications considered. It appears to be crucial to understand how microscopic instabilities model the global behavior of materials. At a larger scale a good understanding of macro-instabilities is necessary to optimize the process of forming, and the security of structures.

The way the participants have judged the organization and the achievement of the colloquium, appears to be very positive as attested by the letter of a Russian participant joined to this report.



Metz, 23th September 1991

A. Molinari, Professor