

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

EUROMECH Colloquium No: 382

Title: Fatigue life in the gigacycle regime

Dates and location: Paris – 29 June – 1 July 1998

Chairman: Claude BATHIAS

Co-chairman: Stefanie STANZL-TCHEGG

Is there need of another Colloquium on the same or a related subject? Which year? No

Full registration fee: 2.650 FF / Industry ; 1.950 FF/ University

What other funding was obtained? 10.000 FF from EDF

What were the participants offered?

Number of members of EUROMECH (reduced registration fee): }  
Number of non-members of EUROMECH (full registration fee): } 75 + 15 students

Number of participants from each country:

Austria	<u>4</u>	Germany	<u>6</u>	Iran	<u>1</u>
Belgium	<u>    </u>	Great Britain	<u>1</u>	Romania	<u>    </u>
Byelorussia	<u>    </u>	Greece	<u>    </u>	Russia	<u>2</u>
Bosnia	<u>    </u>	Hungary	<u>    </u>	Slovakia	<u>    </u>
Bulgaria	<u>    </u>	Ireland	<u>    </u>	Slovenia	<u>    </u>
Croatia	<u>    </u>	Italy	<u>    </u>	Spain	<u>    </u>
Czech Republic	<u>1</u>	Latvia	<u>    </u>	Sweden	<u>4</u>
Denmark	<u>    </u>	Lithuania	<u>    </u>	Switzerland	<u>1</u>
Estonia	<u>    </u>	Netherlands	<u>    </u>	Ukraine	<u>2</u>
Finland	<u>    </u>	Norway	<u>    </u>	Yugoslavia	<u>    </u>
France	<u>45</u>	Poland	<u>1</u>	Others	<u>    </u>
Georgia	<u>    </u>	Portugal	<u>    </u>	Japan	<u>4</u>
China	<u>1</u>	USA	<u>2</u>	Total	<u>30</u>
					+ 45

## **Scientific Report :**

### Subject:

Since Whöler proposed the concept of the S-N curve around 1850, a generation for the fatigue limit is at a given number of cycles, between  $10^6$  and  $10^7$ . The assumption of an horizontal asymptote after  $10^7$  cycles implies an infinite fatigue life criterion. That is a rough approximation. In fact, fatigue fracture can appear after one billion cycles or more. The aim of this colloquium is to discuss long life behaviour, fatigue damage, predictive approaches, the effect of defects and cyclic plasticity in the range of gigacycles of fatigue loading. After a review of the available experimental data, a discussion of the following points of views is planned: competition between inclusions, plane strain and plane stress induced plasticity, numerical simulations, short crack behaviour, effect of the environment after  $10^8$  cycles, cumulative damage beyond  $10^7$  cycles, high frequency fatigue tests and, finally, applications to design.

### Conclusion of Euromech 382:

For the first time, it was shown that the concept of unlimited life in fatigue was wrong. Failure can appear beyond  $10^9$  cycles.

### Publications:

A proceeding was given at the participants. A special issue of FFEMS is foreseen on may 1999. A book is prepared by the chairman of Euromech 382.

### Future:

It was decided to organize an other meeting on the same subject on July 2000 in Austria.