

# EUROMECH

EUROPEAN MECHANICS SOCIETY

# Final Report

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

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EUROMECH Colloquium No: 377

Title: Stability and Control of Shear Flows with Strong Temperature or Density Gradients

Dates and location: May 20 - 21, 1998  
Institute of Thermomechanics CAS, Prague, Czech Rep.

Chairman: Assoc. Prof. F. Maršík, DrSc.

Co-Chairman: Prof. P.A. Monkewitz

Is there need of another Colloquium on the same or a related subject? Which year? 2001

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Full registration fee: 300 DM until April 30, 1998  
360 DM after April 30, 1998

What other funding was obtained? 0

What were the participants offered? Banquet, transport from the airport

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Number of members of EUROMECH (reduced registration fee): 2

Number of non-members of EUROMECH (full registration fee): 13

Number of participants from each country:

Austria	_____	Germany	_____	Romania	_____
Belgium	_____	Great Britain	<u>2</u>	Russia	<u>2</u>
Byelorussia	<u>1</u>	Greece	_____	Slovakia	_____
Bosnia	_____	Hungary	_____	Slovenia	_____
Bulgaria	_____	Ireland	_____	Spain	_____
Croatia	_____	Italy	_____	Sweden	_____
Czech Republic	<u>2</u>	Latvia	_____	Switzerland	<u>2</u>
Denmark	_____	Lithuania	_____	Ukraine	_____
Estonia	_____	Netherlands	_____	Yugoslavia	_____
Finland	_____	Norway	_____	Others	<u>2</u>
France	<u>2</u>	Poland	<u>2</u>	Total	<u>15</u>
Georgia	_____	Portugal	_____		

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Please turn

## EUROMECH COLLOQUIUM 377

### STABILITY AND CONTROL OF SHEAR FLOWS WITH STRONG TEMPERATURE OR DENSITY GRADIENTS

**Chairmen: F. Maršík, Prague, Czech Republic**  
**P.A. Monkewitz, Lausanne, Switzerland**

The colloquium took place on May 20<sup>th</sup> - 21<sup>th</sup> at the Institute of Thermomechanics, Academy of Sciences of the Czech Republic in Prague, Czech Republic. There were 15 participants from 6 countries with a considerable number young researchers and doctoral students from the Czech universities and research institutions. The main topics were introduced by four main lecturers:

B.P. Axcell: *Investigation of a Turbulent Buoyant Sodium Jet*  
F. Maršík: *Laminar-Turbulent Transition in Heated Free Jet*  
P.A. Monkewitz: *The Effect of Density Gradients and Heated Release on Shear Layer Stability*  
O.I. Yas'ko: *On the Problem of Turbulent Arcs Modeling*

Topics discussed comprised the onset of instabilities in cooled and heated free jet and jets with density gradient generated by a pair of concentric axisymmetric nozzles. The condition for absolute instability of heated jet was as well enriched by a possible existing coupling between outer and inner (burner, arc chamber) jet regions. The influence of heated/cooled boundaries on the laminar-turbulent transition in channels and past profiles was shown. The strong sensitivity of a wall jet (Coanda effect) stability on a relative small change of wall temperature (20°C) could have some immediate practical application.

Numerical methods are capable to determine the onset of instability (frequency and modal shape) but nonlinear region is still an open problem. Direct simulation (LES) is at the beginning, however the stable states are described more satisfactorily.

The colloquium was closed by laboratory demonstrations of two experiments showing the stability control by temperature gradients:

- ◆ onset of absolute instability of plasma plume
- ◆ separation of wall jet.

Prague, June 10, 1998

František Maršík