

EUROMECH Final Report

EUROPEAN MECHANICS SOCIETY

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

EUROMECH Colloquium No: 391

Title: **Wind Tunnel Modelling of Dispersion in Environmental Flows**

Dates and location: **September 13th – 15th 1999, Prague**

Chairman: **Zbyněk Jaňour**

Co-chairmen: **Prof. Alan Robins, Prof. Michael Schatzmann**

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

Yes 2001

Full registration fee: **160 EUR**

What other funding was obtained? **Czech Committee of European Mechanics Society**

What were the participants offered? **book of extended abstracts , lunch, welcome**

dinner, refreshment , hotel reservation

Number of members of EUROMECH (reduced registration fee) : **7**

Number of non-members of EUROMECH (full registration fee) : **34**

Number of participants from each country

| | | | | | |
|----------------|-----------|---------------|-----------|--------------|-----------|
| Austria | ----- | Germany | 12 | Romania | ----- |
| Belgium | ----- | Great Britain | 5 | Russia | ----- |
| Byelorussia | ----- | Greece | 1 | Slovakia | ----- |
| Bosnia | ----- | Hungary | ----- | Slovenia | ----- |
| Bulgaria | ----- | Ireland | ----- | Spain | ----- |
| Croatia | ----- | Italy | 1 | Sweden | ----- |
| Czech Republic | 11 | Latvia | ----- | Switzerland | 1 |
| Denmark | ----- | Lithuania | ----- | Ukraine | ----- |
| Estonia | ----- | Netherlands | 1 | Yugoslavia | ----- |
| Finland | ----- | Norway | ----- | Others | 9 |
| France | ----- | Poland | ----- | | |
| Georgia | ----- | Portugal | ----- | TOTAL | 41 |

Wind tunnel modelling of dispersion in environmental flows

Chairmen: Z. Jaňour, Prague, A. Robins, Guildford, M. Schatzmann, Hamburg

EUROMECH Col 391 took place at the Institute of Thermomechanics, Academy of Sciences of the Czech Republic in Prague on September 13th - 15th, 1999. It was attended by 41 scientists from 10 countries, 9 attendees coming from outside Europe. There were 31 presentations, supported by a collection of extended abstracts.

Atmospheric boundary layer research well illustrates the connections and contrasts between observation and theory. In spite of decades of experiments in situ, the structure and dynamics of the atmospheric boundary layer are only partially understood. Fixed probes at a relatively small number of points in space can be weak tools for determining the characteristics of three-dimensional structures with large variations in time and space. Companion wind tunnel simulations are a fruitful tool to complement the large volume of field results; indeed, much of our fundamental understanding comes from laboratory work.

Theoretical models are developed, tested, evaluated and 'harmonised'. In contrast, there has been little equivalent effort in the case of physical modelling, where practitioners largely meet in the framework of various problem-oriented projects. The techniques of physical modelling are often well outside of the main aims of the projects and meetings. An important reason of this is the lack of clear and consistent messages about the validity of the methods and the validation of results. The objective of the Colloquium was to bring together the community involved in the laboratory simulation of flow and dispersion in the atmospheric boundary layer, to discuss mutual problems, achievements and future research directions, to start these barriers crossing.

The scientific program focused on:

- flow and dispersion around buildings and structures (but excluding wind loading, which is well catered for elsewhere),
- flow and dispersion over complex terrain,
- techniques and equipment used in their simulation,
- means by which such simulations are tested and evaluated.

Four new wind tunnels for atmospheric boundary layer simulation and a number of new experimental techniques were described, including a review of the simulation of chemical transformations.

Many contributions were devoted to flow and dispersion around buildings and structures, particularly in the urban environment. New results and data sets for evaluating computational models were presented, covering various configurations of street-canyon and buildings, including the effects of ambient stratification. Comparisons of different wind tunnel measurements were also discussed.

The gas dispersion studies described at the meeting included investigations of the effects of dense gases, stratification and complex terrain, in addition to buildings, and some general conclusions on plume behaviour in these circumstances were put forward. Again, data bases for model evaluation and development were presented.

The issues and difficulties involved in comparing the results of computational and wind tunnel modelling with field data were addressed in some detail. This demonstrated the complications that arose from the wide range of scales of motion that affect dispersion in the field and showed that the larger scales needed to be omitted before comparisons were made. It also showed how data sets that combined field and wind tunnel experiments were the most useful for developing and testing computational techniques and providing fundamental insight.

Two contributions were devoted to physical modelling applications for air pollution assessment and regulatory purposes.

The scope and topics of the Colloquium, and the fact that both completed studies and work in progress were included, produced lively and extended debate amongst the participants that will surely lead to new research and collaboration. The setting and ambience of the hosting institute, the smooth organisation and informal atmosphere and the dinner on the first evening all furthered these ends.

The organisers are very grateful to the Czech Committee of European Mechanical Society for financial support. The Colloquium closed with agreement by all the participants:

- to meet again in two years on the occasion of the launching of a new Hamburg University wind tunnel, and
- to publish the contributions presented at the colloquium in an appropriate journal.