To: bengt.lundberg@teknikum.uu.se
Organization: Hydromechanics Institute
From: "Nina F. Yurchenko" <yur@imm.kiev.ua>
Date: Mon, 20 Feb 95 19:22:32 +0200
X-Mailer: BML [MS/DOS Beauty Mail v.1.36]
Reply-To: yur@imm.kiev.ua
Subject: Re: Euromech-327
Lines: 164

Dear Prof.Lundberg,

Below you will find an e-mail copy of my ill-fated report. The essential,i.e scientific, part of it represents a short version of what was sent for the first time. Fortunately I kept the full text in my computer and can send it if necessary.

If I can help you concerning any problems -- dealt both with the report, and other things -- please, don't hesitate to communicate with me.

With my best wishes,

Nina Yurchenko

Euromech Colloquium No. 327 Dates: 25 - 27 August, 1994

Title: Effects of organized vortex motion on heat and mass transfer

Co-Chairmen: Dr.N.Yurchenko (Institute of Hydromechanics, National Academy of Sci., Kiev, Ukraine)

Prof.H.Peerhossaini (ISITEM - University of Nantes, France)

Place and country: International Centre of Physics, National AS, Kiev, UKRAINE

Is there need of another colloquium on the same subject? Which year?
Yes -- in 3 years.

Finance

Conference fee: US $80. The fee included meals, transportation, volume of abstracts, coffee-breaks, social program

Funding:

US $5,000 -- EOARD (US Air Forse Office of Aerospace Research and Development;
FF 10,000 -- ISITEM-Nantes
Ukrainian coupons 112,000,000 (what was equivalent to US $4,700 according to the exchange rate in August 1994) --
-- National Academy of Sciences of Ukraine

Accomodation (type and cost) : Hotel -- US $25 and $35 / night

Meals: included in the conference fee

Participation

Participation

Number of participants from each country:

Country	Number	Country	Number
Czech Republic	1	Latvia	1
France	10	Russia	3
Germany	2	Sweden	1
Great Britain	1	Switzerland	3
Greece	1	Ukraine	26
Italy	2	Others	5
		Total	56

Scientific report

The objective of the Euromech-327 Colloquium was to provide a forum for researchers and designers from the West and the East to discuss the scientific developments in the subject of the effect of organized vortex motion on heat and mass transfer and to provide suggestions for further lines of research. Contributed papers were presented on original experimental, analytical and numerical work on the following topics:

- Effects of longitudinal vortical structures on heat and mass transfer in the near wall region.

- Physical mechanisms of heat and mass transfer enhancement and space-time scales in temperature stratified boundary layers.

- Nonlinear effects.

- Generation, control and maitenance of longitudinal vortices.

- Effects of body forces of different types - buoyancy, centrifugal, electromagnetic ones (due to the surface heating, curvature, rotation, magnetic fields, etc.) on the vortex dynamics and heat/mass transfer.

- Drag forces in boundary layers with embedded longitudinal vortices.

- Technological and oceanographic applications dealt with the development of organized vortical structures.

Two papers, one from application and the other from fundamental point of view, reviewed the state of the art of the subject matter of the Colloquium and the summarized lecture based on the new developments reported at the meeting prepared the grounds for the final discussion. This discussion stimulated by a small pannel of speakers displayed prospects for future investigations.

The common feature of the works presented dealt with the transport phenomena in organized flows which contained some sort of longitudinal structure, such as rolls, cells and vortices. Special attention was payed to the transport of mass and heat which could be considered as passive tracers only in special cases, and to the role of high gradients in the most sensitive region of the flow, that is in the wall region.

Large vortical structures were shown can arise either naturally, or be generated artificially. Examples of the first kind are the

transverse Tollmien-Sclichting waves, longitudinal vortices which can be considered in the framework of instability mechanisms such as centrifugal instability (Goertler, Dean, Taylor-Couette), rotational instability, one observed in forced convection or representing their combination.

Besides, the analysis of the developing regular vortices and their efficiency for heat transfer was presented having been made on the basis of the study of interaction between two kinds of vorticity (generated due to viscous and body forces in boundary layers).

There has been shown that in certain cases the Reynolds analogy has failed. The mechanism of this effect needs more careful study.

Some theoretical works have shown that two dimensional flow structures may appear to be more efficient for heat transfer enhancement in laminar flows compared to three-dimensional ones, and the opposite in turbulent flows.

From the experimental point of view, the inability to separate the basic flow deformation effect from the measured eigenfunctions shed some doubt on the possibility of the verification of theoretical results. In addition, non-intrusive measurement techniques, especially in the heat transfer measurements, are higly demanded for a more precise verification of theory.

From the application point of view, the overall efficiency of streamwise vortices was analysed for the heat transfer enhancement since the extra friction caused by the secondary flow can nullify the gain in heat transfer. Also technological applications are impeded by the failure of numerical codes in responding to the design requirements.

Many chemical processes include simultaneous mixing and heat transfer. These processes can be effectively intensified by correspondingly organized vortical motion. Longitudinal vortex structures allow to conjugate this advantage with in-line processing. Non-Newtonian fluid behaviour and multiphase flow studies should be included if these applications are to be considered.

Since the last Euromech-261 Colloquium in Nantes, France dealt with the similar problems, the significant progress was observed in the physical understanding of streamwise vortices and their influence on the transport processes near the surface. However many questions still remain open.