CONTENTS

EDITORIAL

Dear EURASAP members,

More and more meetings and conferences are organised worldwide on the topics covered by EURASAP. Several young participants to the UAQ2007, the Harmo 11, the 29th NATO/CCMS ITM (see Future events) will be supported by EURASAP in 2007.

Additionally, AMGI (Andrija Mohorovičić Geophysical Institute) of Zagreb, Croatia and EURASAP are organising workshop on Air Quality Management, Monitoring, Modeling, and Effects in May 2007 (see page 40).

The Newsletter Editor

CFD INVESTIGATION OF AIRFLOW AROUND A SIMPLE OBSTACLE WITH SINGLE HEATING WALL

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INTRODUCTION

The ATREUS project (http://aix.meng.auth.gr/atreus/) of the European Commission Training and Mobility of Researchers Programme (EC TMR) brought together current knowledge on parameters determining the microclimatic environment of urban areas aiming to use it in the optimization of heating and ventilation of buildings.

There are numerous numerical studies on the characteristics of wind fields in street canyons and the influence of the urban heat islands on urban climates (Herbert and Herbert (2002), Xia and Leung (2001), Johnson and Hunter (1998, 1999), Ca et al. (1995), Sakakibra (1996), Hunter et al. (1992)), while there are few numerical studies that investigate the direct influences of surface heating on the flow regime within a street canyon (Ca et al. (1995), Mestayer et al. (1995), Sini et al. (1996), Kim and Baik (1999, 2001)). In general these investigations showed the degree of

flow modification to be dependent primarily on the surface being heating i.e. windward, leeward (with respect to the ambient wind direction) or ground heating, and the aspect ratio W/H, where W is the street width and H is the height of the building.

There are essentially only three wind tunnel studies that look at the influence of thermal effects within the vicinity of buildings: Kovar-Panskus et al. (2001), Uehara et al. (2000), Ruck (1993). Of these only Kovar-Panskus et al. (2001) investigate the influence of thermal effects within a simplified street canyon. Cermak (1996) gives examples of physical modelling using boundary layer wind tunnels and convection chambers to model steady state thermal effects on flow and dispersion over various urban terrains but again only considers the more global effects not local effects within a single street canyon.

There have been many field studies conducted to understand more about urban microclimates and how the localized climate within a street canyon may be influenced by human activity and atmospheric conditions, for example Nunez and Oke (1977), Yoshida et al. (1990/91), Eliasson (1996), Pearlmuter et al. (1999), Santamouris et al. (2001). Fewer studies look more specifically at the influence of localized surface heating due to solar radiation on in-canyon flow fields: Nakamura and Oke (1988), Santamouris et al. (1999), Vachon et al.(2000).

However knowledge on thermal effects due to direct solar radiation within the vicinity of buildings is limited with only a handful of experimental, field and numerical studies show varying degrees of influence of thermal effects (Nakamura and Oke, 1988; Ruck, 1993; Mestayer *et al*, 1995; Sini *et al*, 1996; Kim and Baik, 1999; Santamouris, 1999; Uehera *et al,* 2000; Louka *et al, 2001;* Kovar-Panskus *et al.*, 2001; Huizhi *et al*, 2003; Xie *et al*, 2005).

A combined numerical-field study of Louka et al. (2001) using the Computation Fluid Dynamics (CFD) code CHENSI within TRAPOS project reported the numerical model overestimates the thermal effects on the canyon airflow, predicting two counter-rotating vortices when only one recirculation vortex was observed in the field. Model-scale wind tunnel investigations show further inconsistency with the numerical predictions but are in themselves limited in their scope of study to either for 2D cavities and or full-heated cylindrical building with square cross-section.

The aim of the ATREUS project was to provide information to enhance the understanding of the flow phenomena and flow perturbations due to wall heating within the vicinity of a building. The heating and cooling requirements of buildings are strongly associated with the micro-climatic conditions that develop within their vicinity, in particular with influence due to direct solar radiation. The efficiency of wall mounted air conditioning (A/C) systems maybe severely compromised by an increase in local air temperature. It is therefore important to understand the thermal convection around a building and its influence on local air patterns in order that the efficiency of air-conditioning systems maybe comprehensively assessed. There is insufficient reliable field and experimental data for comprehensive numerical model validation.

This paper describes a validation study in which the thermal effects within the vicinity of a single block building with leeward wall heating has been modelled physically and reproduced numerically in a micro-scale model. A three-dimensional numerical simulation (using CFD code CHENSI) of airflow around simple obstacle with vertical wall heating is presented in this study. The two turbulence models, the standard k-ε model and Chen&Kim (1987), are employed to predict the flow field and thermal effects. Different ratios of buoyancy to inertia forces have been applied to investigate perturbations on the flow due to thermal effects. Model's results were improved by optimisation of the inflow boundary conditions.

MODELLING APPROACH

A 1:100 scale single block building (a cube) has been built and set-up in the Stratified Boundary Layer Wind Tunnel at the Meteorology Institute of Hamburg University. This physical model is unique in that only one of its vertical faces is heated (the leeward face) in order to simulate the influence of solar radiation on one wall of an isolated building. The cube is made from plaster of Paris with the heated face comprising an aluminum plate, which is heated from the inside. Figure 1 shows the model and set-up in the wind tunnel.

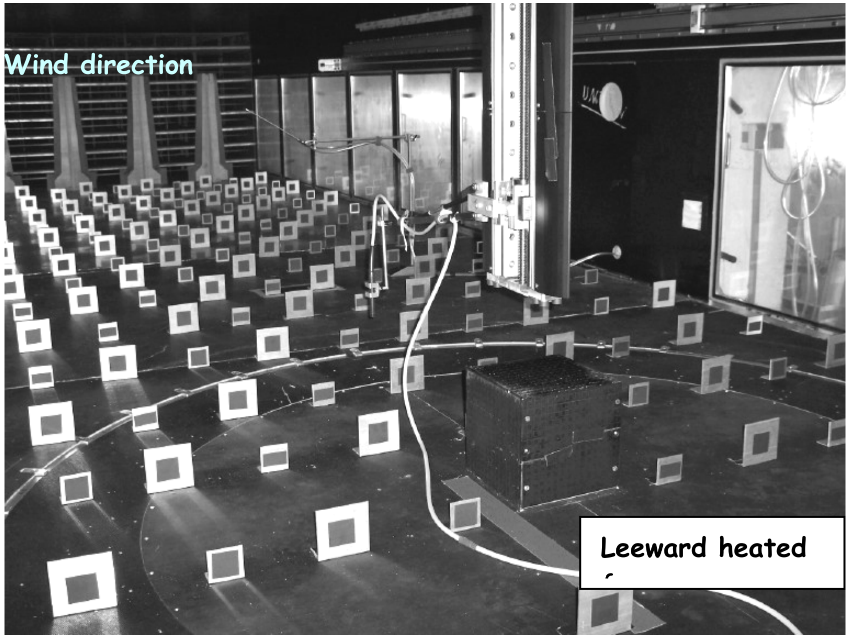


Figure 1. Physical model set-up

While using a single block building may seem a somewhat simplistic approach and perhaps in someway unrealistic, the essence of simplicity is vital when producing data for the validation of a numerical model.

The influence of thermal effects with respect to the mechanical flow around the building is modelled using the ratio of Grashof number to the square of Reynolds number (Gr/Re^2) $\beta g H \Delta T / \overline{U}_H^2$ where β is the coefficient of thermal expansion, g acceleration due to gravity, H is the model height, ΔT is the temperature difference, between the mean wall temperature $\overline{T}_w$ and ambient temperature $\overline{T}_{ref}$ and $\overline{U}_H$ is wind velocity at H just upstream of the model. Low wind speed conditions are used in order to get maximum thermal effects keeping limited wall temperature $\overline{T}_w$ in order to avoid technical difficulties. Reynolds number independence of the flow field around the model has been assured for these low wind speed conditions (U_{ref}=1m/s). An arrangement of sharp edged roughness elements and upstream vortex generators are used to simulate a turbulent atmospheric boundary layer approach flow (Figure 1). The aerodynamic properties of the approach flow were measured using a 2D fibre-optic Laser Doppler Anemometer (BSA-LDA, Dantec ®). In accordance with the official German guideline VDI 3783/Part 12 the modelled boundary layer flow demonstrates the behaviour and characteristics of an urban/inner city like roughness (to a scale of 1:100) with a power law exponent α=0.52, roughness length z_o=2.9m and constant shear layer to 50m.

Wind direction

The CFD code CHENSI (Sini et al, 1996) solves unsteady incompressible RANS equations with the Boussinesq approximation and different k-ε turbulence closure models. The code employs a finite difference method with an upwind weighted scheme for advection. The code is used for simulations of flow, heat transfer and passive scalar dispersion on a hexahedral stretched grid. The time scheme is explicit and first order accurate. Wall functions were used at the solid boundaries.

Care was taken to ensure that the physical model was reproduced in the numerical model. The inflow boundary is defined at 4H upstream of the model as was defined in the wind tunnel. The mesh used for the numerical calculations has total number of 221340 cells (Figure 2).

SIMULATION AND ANALYSIS

"COLD CUBE" CASE

The so named "cold cube" case was used to validate the numerical model. The 3D flow field around the cold cube was measured using BSA-LDA. In addition to the mean longitudinal, lateral and vertical wind velocity component as $\overline{u}$, $\overline{v}$ and $\overline{w}$ respectively, the RMS values of each velocity component as well as the Reynolds shear stresses $\overline{u'w'}$ and $\overline{u'v'}$ were also recorded.

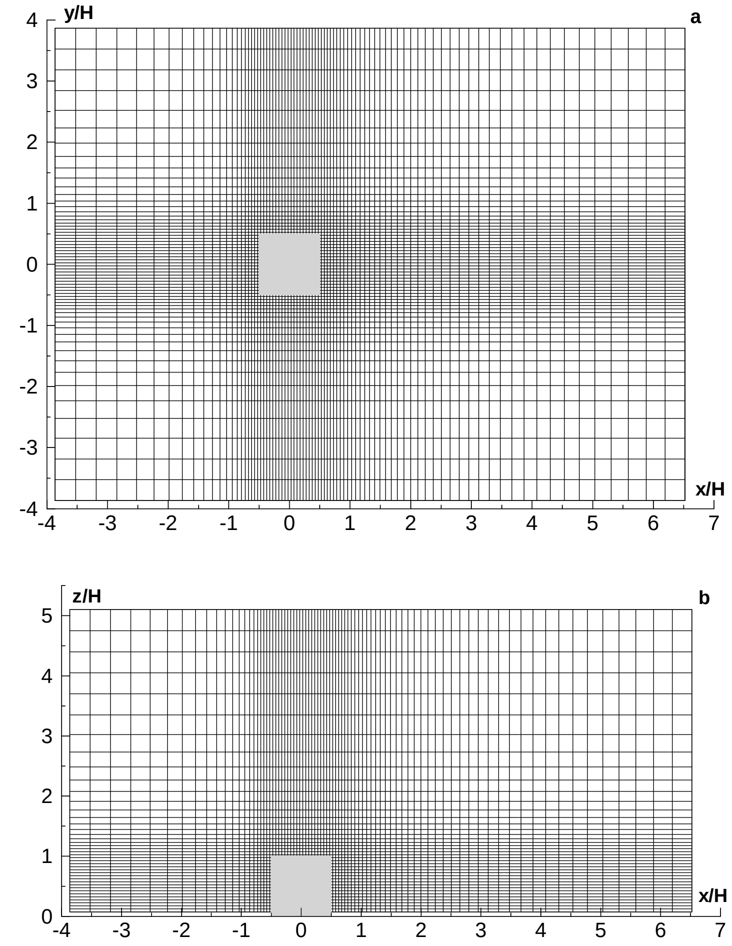


Figure 2. Computational mesh - horizontal (a) and vertical (b) cross section

At the upwind free boundary an inlet velocity profile for the atmospheric boundary layer was applied. Numerical data for two different cases were produced using uniform (***Case 1***) and non-uniform (***Case 2***) inflow fields in the horizontal plane. This was done in order to achieve the flow in-homogeneity observed in the experimental data. Inlet velocity profile was constructed using a power law with parameters provided by wind tunnel experiment and vertical profile for turbulent kinetic energy constructed based on measured data at the cube centre plane only for ***Case 1***. A linear interpolation was made between available experimental data in different locations in the horizontal plane (y/H=-1.5; 0; 1.5) for ***Case 2***. Two turbulence models were employed to predict the flow field for ***Case 1***. The turbulent kinetic energy k and its dissipation rate ε are calculated from the semi-empirical transport equations of Hanjalic and Launder (1972) and the empirical modelling constants are assigned the most commonly used values for industrial flows as in Launder and Spalding (1974) for the standard k-ε model. The inconsistency of this model is very often attributed to the dissipation rate equation, which is highly empirical in nature. Improvement of the model performance is usually achieved by modifying this equation. In the paper of Chen and Kim (1987) the general approach is taken by adding a second time scale of the production range of turbulent kinetic energy spectrum to the dissipation rate equation. This extra time scale enables the energy transfer mechanism of the turbulence model to respond to the mean

strain more effectively. One extra term along with one extra modelling constant added to the standard k-ε model.

Using the same inflow conditions comparisons between these models with experimental data, for different locations, have been made in order to choose the better turbulent model. The locations with the biggest disagreement with the experimental data are shown only (Figure 3). CHENSI tends to over-produce turbulent kinetic energy in the impingement region (at x/H=-0.625). Both models give reasonable results in the cavity zone. The Chen&Kim model gives better results with less disagreement with experimental data.

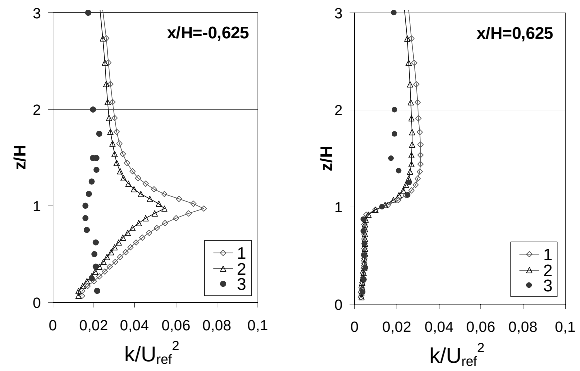


Figure 3. Comparison of the profile of the turbulent kinetic energy observed in the wind tunnel with predictions at x/H=-0.625 and x/H=0.625 at y/H=0 (- denotes upstream the cube centre). Numbers correspond to: 1 - standard k-ε model; 2 - Chen&Kim model; 3 – experimental data

Comparison between ***Case 1*** and ***Case 2*** with wind tunnel data have been made using Chen&Kim turbulent model. The difference between these cases is negligible at the centre cube plane, but are observed far from the obstacle on the horizontal plots for *u* velocity component. The locations close to the obstacle are shown only (Figure 4). Introducing the non-uniform inflow improves the numerical results.

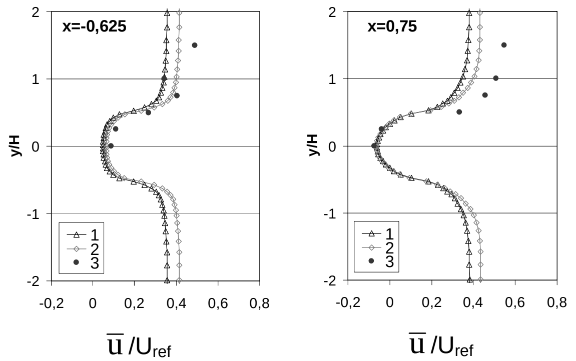


Figure 4. Comparison of the horizontal plots for u velocity component observed in the wind tunnel with predictions at x/H=-0.625 and x/H=0.75 at y/H=0 (- denotes upstream the cube centre). Numbers correspond to: 1 - Case 1; 2 - Case 2; 3 – experimental data.

The model was able to reproduce well the general flow pattern observed within wind tunnel (Figure 5). The oncoming flow exhibits an impingement region at the windward side of the obstacle. When approaching the cube the flow separates due to increasing pressure leading to the development of a main horseshoe vortex wrapping around the cube. At the upper leeward edge of the obstacle the flow separates again and leads to an extended lee vortex formed in the cavity zone immediately behind the cube which interacts with the horseshoe vortex.

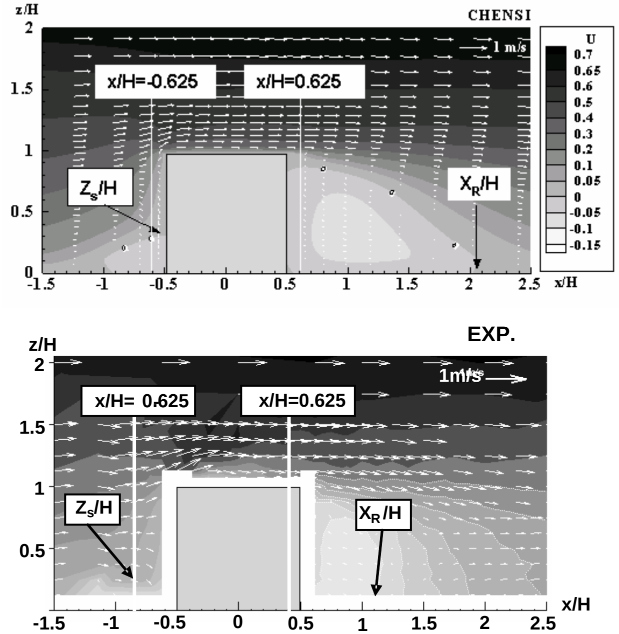


Figure 5. Vertical cross section of the dimensionless u component normalized with the free-stream velocity (U_{ref}=1m/s)

Numerical results for ***Case 2*** are shown at the cube centre plane. The agreement between measured and computed data at the centre plane close to the obstacle is excellent for the velocity field (Figure 6) but not so good for turbulent kinetic energy (Figure 7).

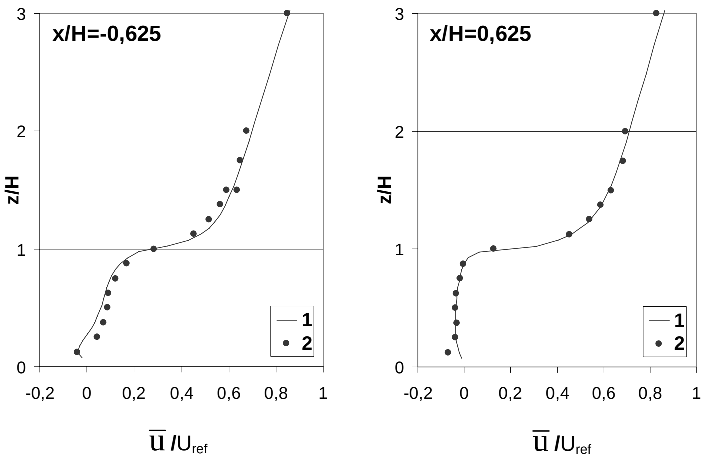


Figure 6. Comparison of the profile of the u velocity component observed in the wind tunnel with predictions at x/H=-0.625 and x/H=0.625 at y/H=0 (- denotes upstream the cube centre). Numbers correspond to: 1 – model data; 2 – experimental data.

Table 1 summarizes the characteristic lengths of the flow field around the cube as predicted by numerical code and derived from the measurements.

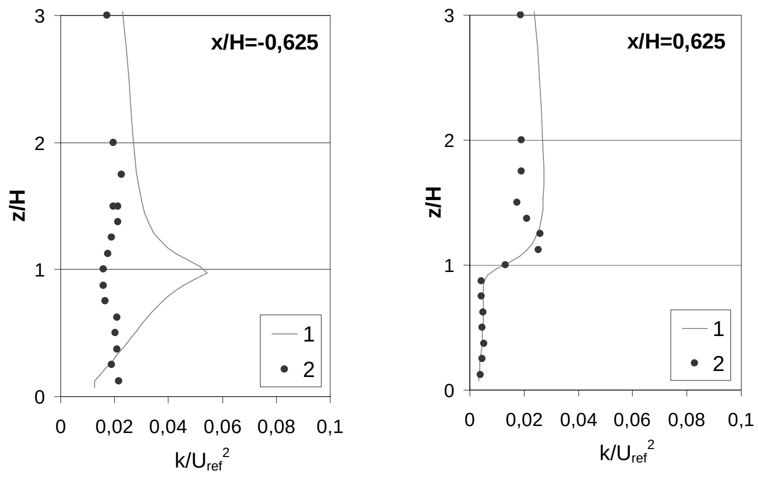


Figure 7. Comparison of the profile of the turbulent kinetic energy observed in the wind tunnel with predictions at x/H=-0.625 and x/H=0.625 at y/H=0 (- denotes upstream the cube centre). Numbers correspond to: 1 – model data; 2 – experimental data

Table 1. Characteristic lengths of the flow field

Characteristic lengths:	Numerical produced	Experimental measured
Stagnation point Z_s/H	0.29	0.18
Reattachment point X_R/H	2.0	1.34

CHENSI predicts a higher value for the stagnation point height on the upwind edge. Close to the observed reattachment point at the centre plane, the model computes a negative velocity close to the surface indicating that this position is predicted to be still far inside the cavity zone. CHENSI overestimates the recirculation length by about 30%.

"HEATED CUBE" CASE

When the relation $Gr/Re^2 \approx 1$ motion is induced by both thermal and mechanical effects and if $Gr/Re^2 > 1$ then thermal effects are dominant. Different values of Gr/Re^2 have been selected in order that the influence of these thermal effects may be assessed. One of the activities within the project was concerned with the development of the CHENSI code. The thermal effects on the airflow within a street canyon, produced by direct solar heating of the street sides and ground were investigated within TRAPOS Project. It was observed within the Nantes'99 experiment (Louka et al, 2001) that a thin thermal layer develops locally within a few cm from the heated wall. Based on the temperature and wind flow measurements simulations were made using CHENSI. The conclusion drawn from 2D simulations was that the model overestimated the thermal effects on the canyon airflow showing the main re-circulation simulated in the isothermal case to change into two counter-rotating vortices after the inclusion of the heating of the windward wall. The fault was thought to lie with the implementation of a temperature wall function for such thin thermal boundary layer in conjunction with the limitation in grid resolution.

The wall boundary condition used for temperature in CHENSI is a wall function based on the temperature gradient normal to the wall (Sini et al., 1996). This type of wall function for temperature has been validated for thick thermal boundary layers (Levi-Alvares, 1991). Figure 7 illustrates two grid cells attached to a vertical wall as used in CHENSI. Cell 1 is where the wall conditions are applied, while cell 2 is where temperature is calculated.

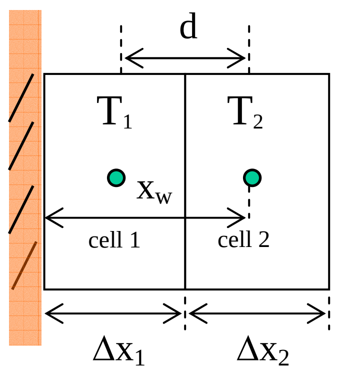


Figure 7. Scheme of grid cells attached to a vertical wall as treated in CHENSI

The temperature at cell 1 is calculated by temperature at cell 2 (T2) and wall temperature (T_w), using relation given by Eq. 1.

$$T_1 = T_2 - A(T_2 - T_w)$$ Eqn. 1.

The function A is given by Eqn.1 with the von Karman's constant κ=0.4 and Cμ=0.09; d is the distance in the x-direction between the cell centres, z0 - the roughness length of the wall, xw - the distance from the wall to the second grid cell, k – the turbulent kinetic energy and νt – the turbulent viscosity in cell 2.

$$A = \frac{\kappa C_\mu^{1/4} d}{\ln\left(\frac{x_w}{z_0}\right) + \frac{P}{\kappa}} \frac{\sqrt{k}}{\nu_t}$$ Eqn. 2.

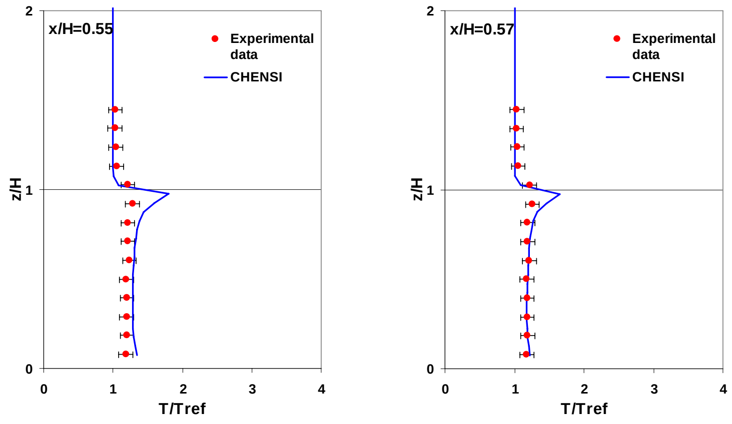
P (Eqn. 1) is the widely used Jayatilleke (1969) parameter, depend of mean (Pr) and turbulent (Prt) Prandtl number.

$$P = 9.24\left[\left(\frac{Pr}{Pr_t}\right)^{0.75} - 1\right]\left[1 + 0.28\exp\left(-0.007\frac{Pr}{Pr_t}\right)\right]$$ Eqn. 3.

Initially simulations were performed using described wall function considering both thermal cases with conditions, characterized by non-dimensional number Gr/Re2 ≈ 0.9 and Gr/Re2 ≈ 1.6 as in the experiments. A disagreement was seen

between calculated and experimentally measured non-dimensional temperature profiles: approximately 1.45 for the case with thermal conditions Gr/Re2 ≈ 0.9 and more than two times 2.33 for the case with strong thermal conditions Gr/Re2 ≈ 1.6 within nearest to the heated wall cell at cube centre plane. The disagreement was more significant for the plane y/H=0.5, refer to the lateral cube face. To derive a relation for wall function independent from the Grashof and Reynolds numbers a bigger number of different thermal conditions are needed. Unfortunately only two cases were measured, because of time restriction within the project and some technical difficulties, encountered during the wind tunnel experiment. The standard wall function, implemented into the model, provides a good shape for the temperature profile, but overestimates the magnitude close to the heated wall. It is for this reason that different values of wall function A were tested and compared to the measured data. A reasonable agreement between numerically calculated and experimentally measured data for both thermal cases was achieved using a function two times less than standard. Dividing the standard function by factor two proved good numerical results close to and far away the heated wall at the same time for these two thermal cases. But this is only simple way to improve model's result and further analysis, based on different thermal conditions is need in order to derive independent thermal wall function representative for all spectrum of non-dimensional numbers Gr/Re2.

Comparison of the non-dimensioned temperature (T/Tref) observed in the wind tunnel with predicted using new thermal boundary conditions are presented in for both thermal cases. Vertical profiles at different locations in planes y/H=0 and y/H=0.5 are available. Only profiles closed to the heated wall at cube centre plane for thermal cases Gr/Re2 ≈ 0.9 and Gr/Re2 ≈ 1.6 (Figure 8) are presented here. CHENSI predicted adequately the temperature profiles close to the heated surface using the newly derived thermal boundary conditions. The disagreement close to the lateral cube face and top of the obstacle is due mainly to heat losses during the experiment. The same temperature value of the heated wall was prescribed in the numerical simulations, while only drop in the centre of the surface was achieved this temperature in the experiment. It was difficult to estimate real temperature losses close to the heated surface boundary and prescribe these as input for numerical simulations. The disagreement with experimental data was estimated within the cavity zone and the reason is that the model overestimates the recirculation length because of turbulent model used.



Gr/Re2 ≈ 0.9

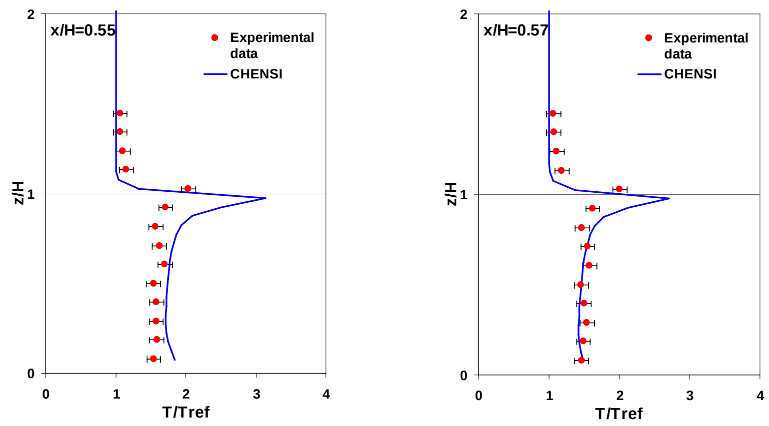


Figure 8. Vertical profiles of non-dimensioned temperature

Figure 9 shows contour plots of velocity field with wall heating for both cases. The thermally induced upward motion close to the heated face acts together with the mechanical flow to strengthen the clockwise rotating vortex within the wake of the cube. While this is observed for both cases the effect is stronger for $Gr/Re^2 \approx 1.6$ as buoyancy forces become more significant. Compared with the "cold cube" case the recirculation length for the condition $Gr/Re^2 \approx 1.6$ is approximately 10% shorter ($X_R/H=1.8$ as opposed to 2.0) but the size of the region has expanded due to the added buoyancy and the increase in vertical motion.

Figure 10 shows contour plots of vertical velocity field with and without wall heating. In both thermal cases there is the tendency for an increase in the magnitude of the vertical velocity and an extension of the cavity zone through increased upward motion (Figure 10b, c). The tendency is stronger for thermal conditions $Gr/Re^2 \approx 1.6$. The dynamics and thermal buoyancy act in concert: compared to the isothermal flow, the intensity of the unique vortex is increased, generating a net increase in the vertical exchanges and exchange rates. The wall heating can largely influence the flow pattern due to vertical transport capabilities. The vertical velocity pattern is different in the planes of cube's lateral faces, where the buoyancy effect is stronger compared with the cube centre plane (Figure 10c, d).

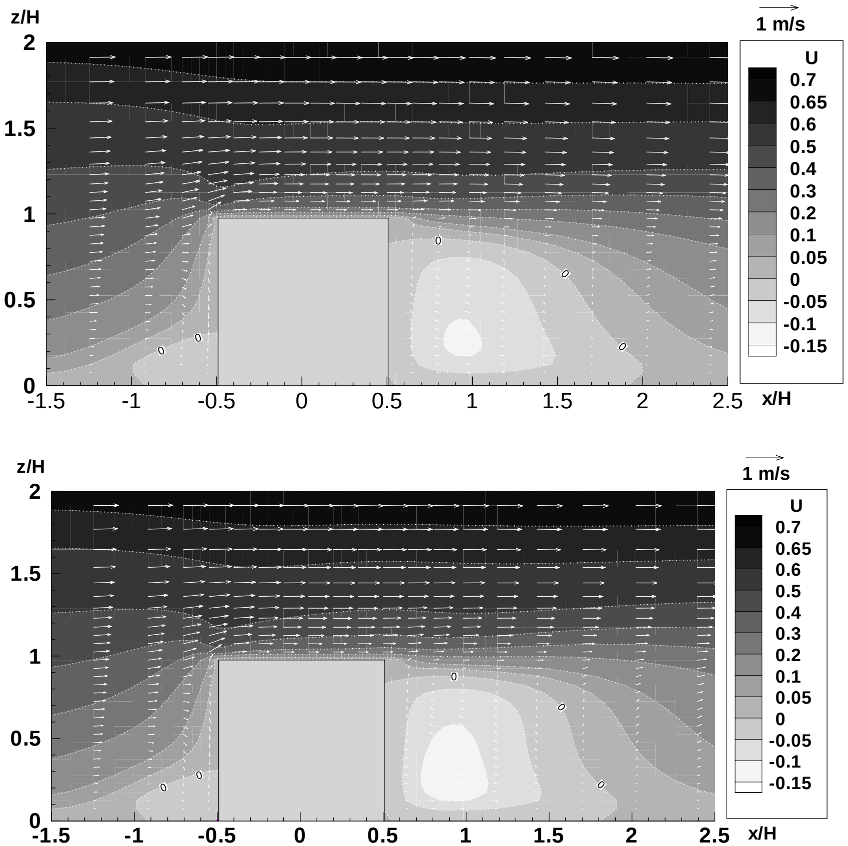


Figure 9. Vectors and contours for u velocity component for "heated cube" with values $Gr/Re^2 \approx 1$ (a) and $Gr/Re^2 \approx 1.5$ (b).

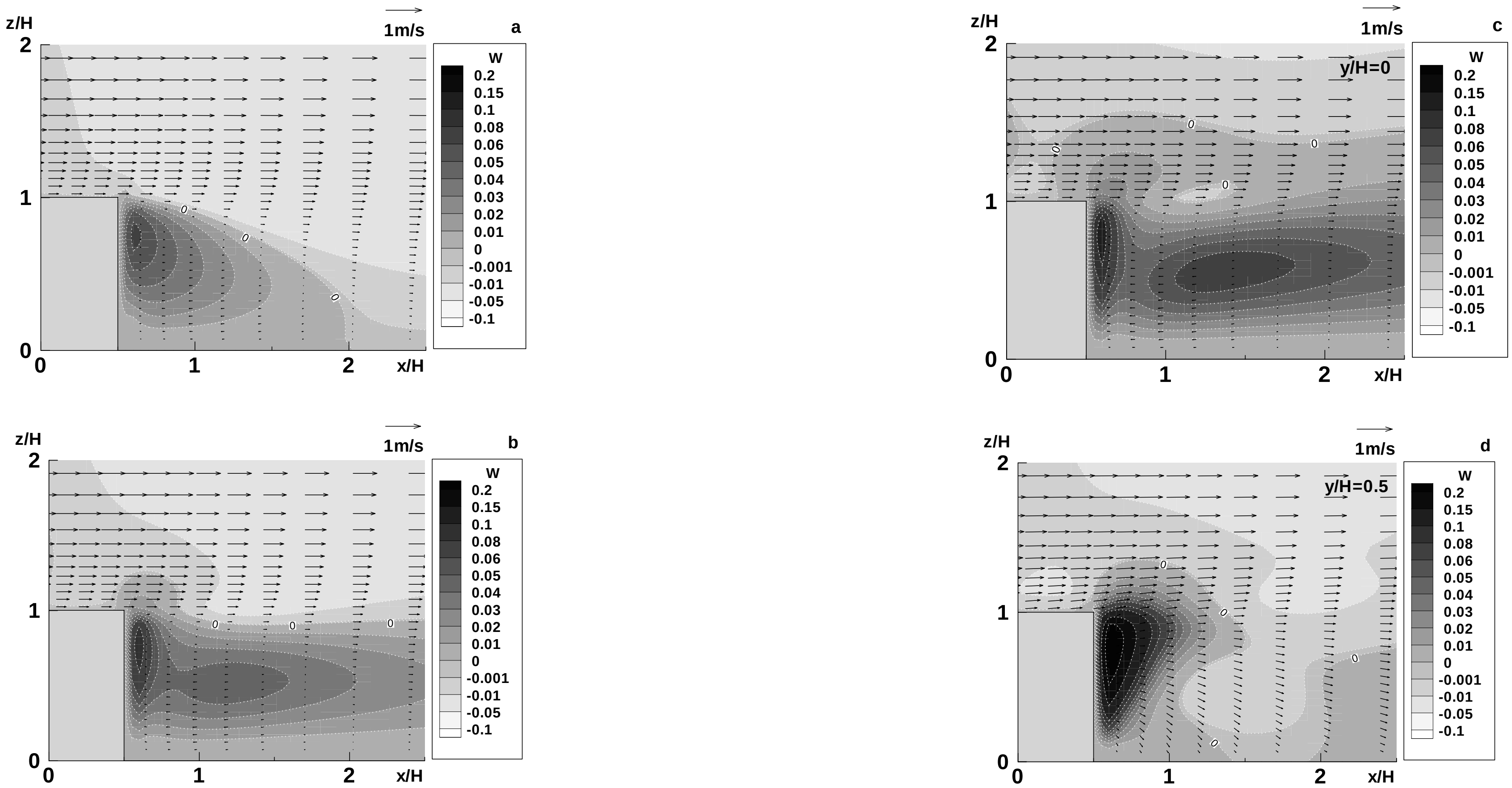


Figure 10. Contours for vertical velocity and velocity vectors for "cold cube" (a); "heated cube" with values $Gr/Re^2 \approx 0.9$ (b) and $Gr/Re^2 \approx 1.6$ (c) at cube centre plane y/H=0; "heated cube" with value $Gr/Re^2 \approx 1.6$ at y/H=0.5 (d).

Vertical velocity plots for isothermal and both thermal cases are shown at the cube centre plane at different levels (Figure 11). The magnitude of the vertical velocity increases by about 85% ($Gr/Re^2 \approx 1.6$) and 48% ($Gr/Re^2 \approx 0.9$) near the wall (x/H=0.1) compared with "cold cube" case. The maximum values in the vertical velocity field occur at z/H=0.75 and the minimum at about x/H=0.4 from the wall for both thermal cases. The most important feature is the development of a steep horizontal gradient very close to the wall. The vertical velocity changes sign for both thermal cases compared with "cold cube" case at distance more than x/H=1.

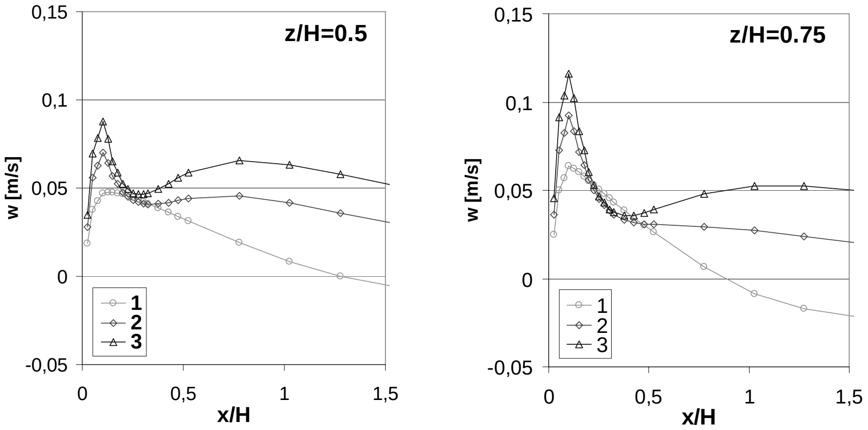
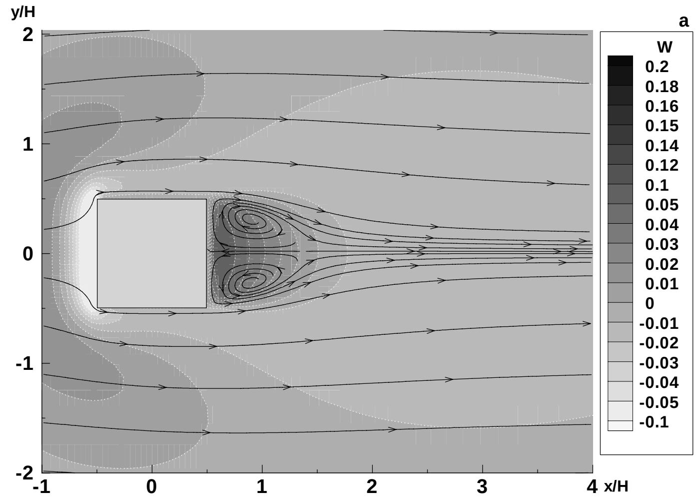


Figure 11. Vertical velocity plots at different levels at cube centre plane (y/H=0). Numbers correspond to: "cold cube" (1), "heated cube" with value $Gr/Re^2 \approx 0.9$ (2) and $Gr/Re^2 \approx 1.6$ (3).

The horizontal plots of the vertical velocity field at level z/H=0.75 where maximum values achieved and are shown in Figure 12. Additional circulation due to thermal effects appears close to the lateral cube faces on the contrary to strong upward motion near to the lateral cube's edges. Two mechanically induced vortices with opposite rotation move the heated air near the lateral cube's faces and contribute to the upward motion. Downward motion with the same magnitude similar to that upstream of the cube can be seen for case $Gr/Re^2 \approx 1.6$.



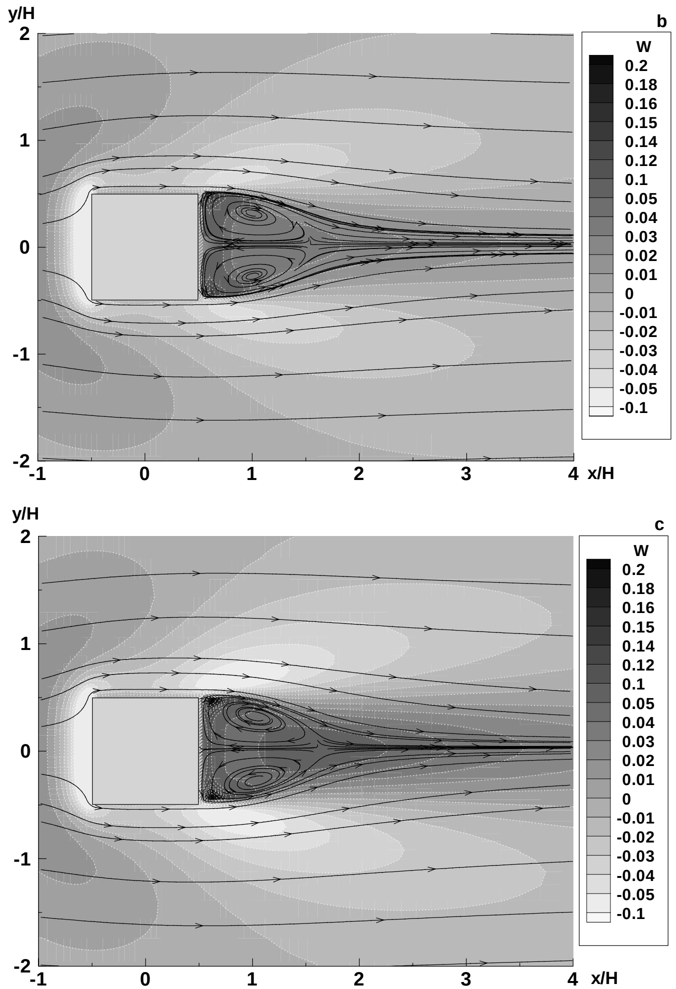


Figure 12. Horizontal plots of vertical velocity field for "cold cube" (a) and "heated cube" with values $Gr/Re^2 \approx 0.9$ (b) and $Gr/Re^2 \approx 1.6$ (c) at level z/H=0.75

The structure of the temperature field is presented at Figure 13. The maximum difference between wall and ambient temperatures appears near the top outer edges of the cube. The thermal plume that forms as a result of the heating of the air close to the surface is warmer, less dense air meets the cooler mechanically driven flow from over the top of the cube it is washed downstream hence the elongated temperature distribution at the upper trailing edge of the cube. The maximum temperatures recorded were at the upper trailing edge of the cube. The results imply that the majority of heat is transported away.

CONCLUSIONS

The influence of microclimatic conditions on the energy behaviour of buildings began to constitute a major research field in the last decades. Urban meteorological conditions affect the energy use due to the "heat island" effect. Peaks in electricity demand occur more frequently during the summer period in most developed countries, because of the increasing use of air-conditioning. The work have been made into ATREUS project attempt to determine an optimum way of designing/choosing HVAC systems, based on economic evaluations, energy consumption and environmental impacts. The intensity of the heat island is mainly determined by the

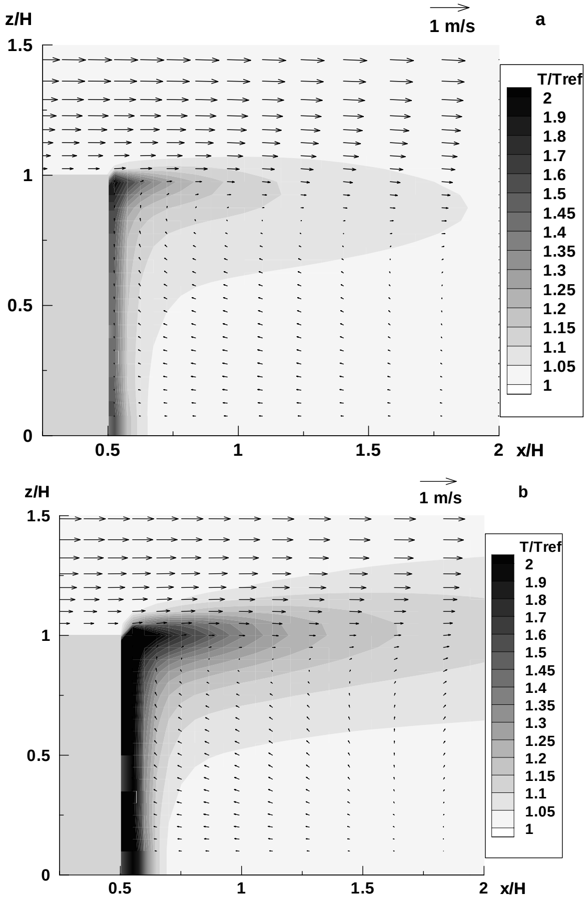


Figure 13. Velocity vectors and contours for temperature difference between wall and ambient air different "heated cube" cases with values $Gr/Re^2 \approx 0.9$ (a) and $Gr/Re^2 \approx 1.6$ at central cube plane y/H=0.

thermal balance of the urban region and can result in up to 10 degrees of temperature difference. Higher urban temperatures have a serious impact on the electricity demand for air conditioning of buildings. The conditions described by the term 'street canyon' that contribute to the development of the heat island phenomenon, characterise this environment. The operational demands of buildings are determined by both these conditions and contribute to their enhancement. There is not doubt that good performing of the temperature and flow fields within urban environment will contribute to find optimum way of designing of HVAC building systems.

ACKNOWLEDGEMENTS

The present work was carried out within the ATREUS network (Advanced Tools for Rational Energy Use towards Sustainability with emphasis on microclimatic issues in urban applications) in the framework of the European Community Marie Curie Research Training Programme. The numerical calculations were carried out on the supercomputers of the CNRS national computing centre. Complete computer support was given by the Scientific Council of Institut de Développement et de Recherche pour l'Informatique Scientifique (IDRIS), Orsay, France.

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Reneta is a young scientist at the Geophysical Institute, Bulgarian Academy of Sciences. EURASAP granted to her participation in **ICUC-6** (The Sixth International Conference on Urban Climate (ICUC-6), held in Göteborg Sweden, June 12-16 2006).

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PRESENTING EUSCEA: THE EUROPEAN SCIENCE COMMUNICATION EVENTS ASSOCIATION

Antoaneta Iotova, National Institute of Meteorology and Hydrology, Sofia, Bulgaria

Recently, it becomes more and more clear that partnership can be the key for success of many actions and activities in the field of environment, both nationally and internationally, because they require relevant perception and understanding by different members of the society. The collaboration and common efforts between research community, policy and decision makers, business, NGOs and citizens through establishment of partnerships can be really effective for policy integration and implementation ("mainstreaming") of environmental issues into economic and social spheres as well as everyday life.

That is why in the environmental legislation, both European and international, partnership is now recognized to be of essential importance for achievement of society's goals and for solving societal problems related to environment. This is also true for great number of collaborative projects that include tasks like "Outreach activities", "Public information", "Policy support" and so on (for example, the ACCENT - http://www.accent-network.org/portal/outreach-tasks/public-information-and-policy-support), and attention towards partnership has to be paid at the stage of consortium establishment and preparation of the proposal. Here, relevant European associations can be considered and the EUCSEA can be a good option as a partner.

Founded in 2002, EUSCEA - the European Science Communication Events Association, is "the one and only platform to exchange experiences about the organisation of science communication events in Europe with currently more than 50 institutions and organisations from 31 countries as

members" (http://www.euscea.org/AboutEUSCEA/about_euscea.html).

According to its statute, EUSCEA is "non-profit scientific Society that extends its activities particularly to the countries of the EU and the countries associated with it but it also operates beyond them. The purpose of the Society is the promotion of public

awareness and understanding of science, technology and the humanities and promotional activities for science. The Society does this by creating a platform for the primarily European "Science Events" organisations thereby promoting dialogue between the public, the media and the scientific community. Science communication Events (SCEs) are events where scientific topics are presented as comprehensibly and widely as possible to the public. SCEs have different names, they are called science - or research, technology - festivals, weeks, days, summer or night of research/researchers. Many such events have evolved all over Europe, from Slovenia to Sweden, from Portugal to Poland, from Israel to Iceland - and more are on the way ".

The Society's executive bodies are the General Assembly, the Executive Committee, the Auditors, and the Arbitral Tribunal. It has its seat in the capital of Austria, Vienna.

Since its establishment, the EUSCEA has made and continues to perform a number of activities, projects, etc. Examples are:

• The "WHITE BOOK on Science Communication Events in Europe"

• WONDERS (**W**elcome to **O**bservations, **N**ews and **D**emonstrations of **E**uropean **R**esearch and **S**cience) - the European Science Festival, coordinated by the EUSCEA, is run for second time in 2007 together with EUN, the European Schoolnet, and EUSJA, the European Union of Science Journalists Associations. The core of the WONDERS project is the "**CAROUSEL of SCIENCE**", in which partners exchange their best science communication presentations, i.e. the partner from Sweden goes to Bulgaria and takes part in the Bulgarian Science week, the Bulgarian partner goes to Germany to take part in the German science communication event, etc.

The Bulgarian partner for the WONDERS project and for other activities of the EUSCEA is Forum Democrit (http://www.democrit.com): it is founded in 2002 as non-governmental and non-for-profit organization aiming to enhance the public understanding of science, to improve the image of Bulgarian scientists and to promote interest in science among young people in the country. For WONDERS2007, as partner of the "Carousel of Science", Forum Democrit organizes Bulgarian Science Week planned

for the end of September. It will be focused on the topic "The Miracle Of Systematics, or How Hard Is To Put In Order The Second Richest Biodiversity In Europe?" because the main theme for WONDERS2007 is "**LOOK CLOSER**" in commemoration of the 300th anniversary of the birthday of Carl Linneaus, the founder of the biological naming system. During the Week, different science communication events will happen, including introductory presentation in the National Museum of Natural History in Sofia, field walk in the mountain, presentation by the EUSCEA-WONDERS Swedish partner. The Week will end with a common event within the Researchers Night in Sofia on the 28 September.

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Future events

AMGI/EURASAP Workshop on Air Quality Management, Monitoring, Modeling, and Effects
Zagreb, May 24-26, 2007

The Workshop is organised by AMGI (http://www.gfz.hr/eng) and EURASAP (www.eurasap.org).

The Workshop objectives are to:
- Provide background on different aspects of science and policy for air quality improvement at local, regional, and global scales.
- Share information among different disciplines in the atmospheric, meteorological, health sciences.
- Provide a public forum for explaining the nature and potential impacts of waste-to-energy facilities and other stationary industrial sources.

Workshop Chair: Prof. Peter Builtjes, TNO, Apeldoorn, the Netherlands

Local organiser: Zvjezdana Bencetić Klaić, AMGI, Department of Geophysics, Faculty of Science, University of Zagreb

Register by 15 May 2007 to zklaic@rudjer.irb.hr

The workshop will begin on Thursday, May 24, 2007, 08:00.
The workshop will end on Saturday, May 26, 2007, 12:30.

The Workshop will be held at the Andrija Mohorovičić Geophysical Institute (AMGI), Department of Geophysics, Faculty of Science, University of Zagreb, Horvatovac BB.

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UAQ2007 - 6TH INTERNATIONAL CONFERENCE ON URBAN AIR QUALITY
27-29 March 2007, Cyprus, Organisers - University of Hertfordshire and University of Cyprus jointly with ACCENT, COST 728 and Cyprus International Institute for the Environment and Public Health in Association with Harvard School of Public Health
http://www.urbanairquality.org

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FRAMING LAND USE DYNAMICS II
18-20 April 2007, Utrecht University, The Netherlands
http://www.geo.uu.nl/flud2007

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GKSS SUMMER SCHOOL - "PERSISTENT POLLUTION: PAST, PRESENT AND FUTURE"
9–18 May 2007, Hunting castle Göhrde near Lüneburg, Germany
http://coast.gkss.de/events/5thschool/

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ICAM 2007 - INTERN. CONFERENCE ON ALPINE METEOROLOGY
4-8 June 2007, Chambery, France,
http:// www.cnrm.meteo.fr ,
http:// www.cnrm.meteo.fr/ICAM2007

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FIFTH INTERNATIONAL CONFERENCE "AIR'2007" QUALITY OF ENVIRONMENT,
5-7 June 2007, St. Peterburg, Russia
Contact: Prof. N. Z. Bitkolov, President of AE
E-mail: bitkolov@peterlink.ru and bitkolov@rol.ru

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HARMO 11 Conference - 11^TH INTERNATIONAL CONFERENCE ON HARMONISATION WITHIN ATMOSPHERIC DISPERSION MODELLING FOR REGULATORY PURPOSES
July 2nd-5th, 2007 Cambridge, United Kingdom, Cambridge Environmental Research Consultants
http://www.cerc.co.uk/HARMO11/
http://www.harmo.org/harmo11

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SECOND ACCENT SYMPOSIUM
23-27 July 2007, Urbino, Italy
http://www.accent-network.org/2nd-symposium

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7^TH EMS ANNUAL MEETING AND 8^TH EUROPEAN CONFERENCE ON APPLICATIONS OF METEOROLOGY
1 - 5 October 2007, San Lorenzo, de El Escorial, Spain

Jointly organised by EMS, INM, AME, AMS

Abstracts submission by 25 May 2007 at
http://meetings.copernicus.org/ems2007

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29th NATO/SPS - INTERNATIONAL TECHNICAL MEETING ON AIR POLLUTION AND ITS APPLICATION
24 –28 September 2007, Aveiro, Portugal, University of Aveiro
http://www.dao.ua.pt/itm

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CALPUFF Training Course Program for Spring 2007

TRC is pleased to announce two 3-day CALPUFF modeling courses. More details including course outlines, hotel information and registration forms can be obtained from the CALPUFF web site (www.src.com).

The courses will be held at: **Scottsdale, Arizona – April 10-12, 2007,** and **Washington, DC Area (Arlington, VA) – May 9-11, 2007.**

Instructors: Joseph S. Scire and Francoise R. Robe

EUROPEAN ASSOCIATION FOR THE SCIENCE OF AIR POLLUTION

MEMBERSHIP FORM 2006

Please fill out the details below and return to:
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It is available to download it from http://www.meteo.bg/EURASAP