GCOE Program TPU
New Frontier of Education and Research in Wind Engineering

Wind Effects

New Frontier of Education and Research in Wind Engineering

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INDEX

Annual Report of Global COE Research Projects

Project 1 Wind Hazard Mitigation

The objective of research project 1 was to promote and develop wind engineering technologies to mitigate wind disasters. The following researches were conducted in 2008FY.

Development of tornado-like-flow simulator and measurement preparation for wind speeds and pressures

Actual tornado damage is very complex aspect, making it very difficult to interpret how accidents have occurred and to evaluate applied wind forces. The objectives of this research were to investigate the flow fields and pressure fields of tornado-like swirling flow and the behaviors of low-rise buildings under tornado-like flow, and to establish a design-based tornado model to evaluate wind effects on wind-sensitive structures. To this end we set up experimental systems for measuring wind velocities and pressures using a tornado simulator, investigated basic pressures on a cube, modified a moving tornado simulator to create stable swirl flows and developed a large tornado simulator for measuring its wind speed distributions.

Surface pressure and characteristics of wind load on prisms immersed in a transient gust front flow field

Thunderstorm-generated gust fronts are responsible for various degrees of structural damage in many areas of the world. However, the resulting impact of gust-front winds is not understood well enough to accurately quantify their flow kinematics, dynamics and impact on structures. Gust-front winds are transient in nature and have a flow profile that differs significantly from that of a typical boundary layer flow field. This study focuses on the effects of this flow profile and its transient nature on the aerodynamics of bluff, prismatic bodies. A gust-front-type flow field is generated using a multiple-fan wind tunnel and the resulting surface pressures are captured on a suite of prismatic models, which vary in size in relationship to the oncoming wind profile. The temporal variations in surface pressures are analyzed using traditional time, frequency and time-frequency domain schemes. Results indicate the changing nature of the surface pressure field with time, highlighting both qualitative and quantitative differences between local and area-averaged pressures under a host of flow profiles.

GPS wind response monitoring/ networking aimed at ensuring building safety

This research has focused on determining GPS wind response monitoring and networking aimed at ensuring

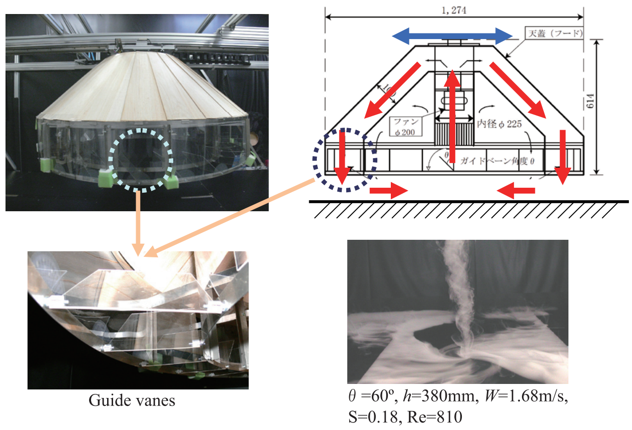


Figure 1. Movable updraft system

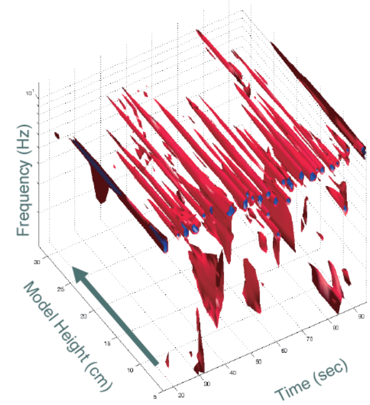


Figure 2. 3-dimensional wavelet scalogram generated in the spanwise direction along the leading edge

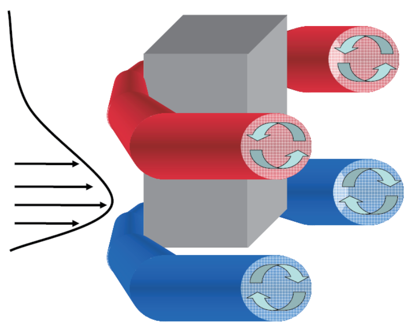


Figure 3. Caricature of idealized flow structure resulting from gust front flow.

building safety GPS antennae (using 2 choke ring antennas) were installed as reference stations on top of a 3-story RC building at the Nakano Campus of Tokyo Polytechnic University (3km from the Shinjuku area) and on top of a 4-story RC building in the Sumida area (7km from the Shinjuku area), Tokyo. A network of reference stations will be established to improve the accuracy of GPS measurement. A virtual reference station (VRS) was introduced to avoid the need to install reference antennae in urban areas such as Shinjuku. Three real reference stations located in Yamanashi Prefecture and Kanagawa Prefecture were chosen to establish the VRS, as shown in Figure 4. The distances between the coordinates of VRS and these three stations are about 40km each. A static test was conducted to investigate the accuracy of the GPS signal by using VRS. The results showed that the errors in the 10-min-mean signal and the r.m.s values of the GPS signal using VRS were almost the same as that of the GPS signal using the real reference stations, thus verifying the effectiveness of VRS under static conditions and making it unnecessary to install a reference GPS antenna near the moving station. A sinusoidal vibration test was conducted to investigate the accuracy of the dynamic response of the GPS signal by using VRS. As shown in Figure 5, although the accuracy of the GPS signal using VRS was affected by the condition of the original GPS signal, it is good enough to use for response monitoring in urban areas when the conditions are good.

VORTEX-Winds: Virtual Organization to Reduce the Toll of Extreme Winds on Society

The objectives of the research were to establish VORTEX-Winds (Virtual Organization to Reduce the Toll of Extreme Winds on Society). VORTEX-Winds coordinates geographically dispersed e-analysis and design modules and knowledge base to enable automated, integrated analysis and design of structures and facilitates education and training of the future work force; to establish and sustain a community contributing to and employing the resources integrated by cyber-infrastructure technologies; to enhance analysis and design capabilities concerning the effects of extreme winds on civil infrastructure; and to facilitate education and training of the future work force in the field.We established an initial membership of a virtual collaboration that included participation from global members; established an organizational structure for the collaboration; developed a basic architecture for e-analysis, design modules and knowledge base; established a Drupal-based secure web portal to serve as the collaboration cyber-interface;

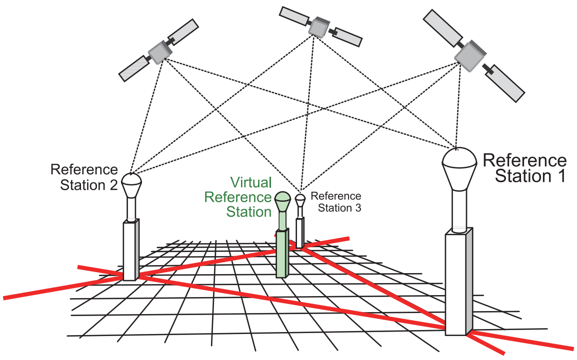


Figure 4. Schematic view of Virtual Reference Station (VRS)

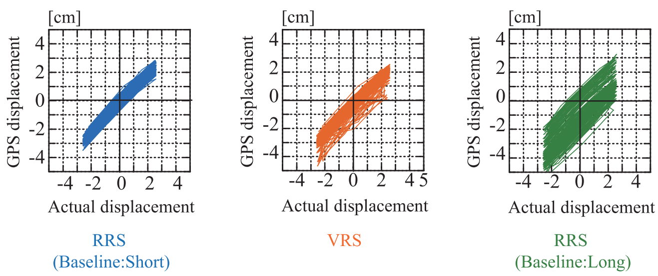
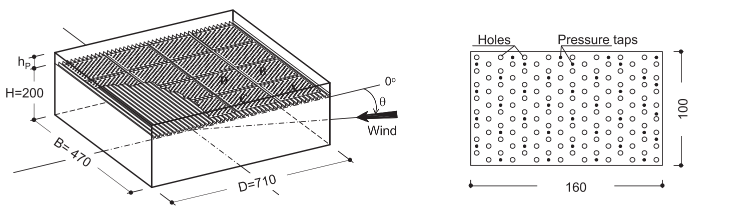


Figure 5. Relationship between actual displacement and GPS displacement for sinusoidal vibration test (f =0.15Hz A=25mm)



(a) Geometry of the test model (b) Detail of a porous cover roof sheet

Figure 6. Wind loading on porous cover roof sheets for a low-rise building

established a preliminary framework for the development of a database-assisted design module by integrating databases at Notre Dame and Tamkang Universities (members of the collaboration); and initiated a population of a knowledge base, e.g., windwiki, crowd sourcing of the analysis of glass damage in Hurricane Ike.

Study on wind loading on porous cover roof sheets for a low-rise building

Thermal reduction is always a problem for building roofing systems, especially profiled steel sheet systems, and roofing systems with cover sheets have been applied to overcome it. This was a new study on wind loadings on porous roof cover sheets. This research focused on determining wind loading on porous cover roof sheets on a low-rise building under the effects of parapet, porosity, underneath volume, terrain category, and roof style. Besides, a numerical method based on the unsteady form of the Bernoulli equation was applied to predict lower pressures from known upper pressures and the computational results were compared with experimental results. Moreover, a field measurement and an investigation will be done using CFD (Computational Fluid Dynamics). Results of this study will be useful for practical design.

Study on relation between modern roof constructions methods and meteorological conditions

In planning cladding construction methods, it is important to consider wind and rainfall conditions. In the practical design of curtain walls, for example, detailed design conditions are established based on the joint probability of wind and rainfall. In studying traditional cladding construction methods in East Asia, the latest meteorological database was used to determine wind and rainfall conditions and to estimate their joint probability. A method was proposed in which similarities were evaluated by applying principal coordinate analysis of the joint probability of wind and rainfall. As a result, the first principal coordinate showed a high probability of simultaneous occurrence of wind and rainfall. The highest score was seen in the Muroto Promontory data and the second principal coordinate showed high probability irrespective of wind speeds. The highest score was seen in the Jakarta data.

Project 2 Natural/Cross Ventilation

This project was aimed at developing a method of designing natural/cross ventilation for sustainable buildings utilizing natural wind, and at establishing a hybrid system for dehumidifying and cooling using natural draft and radiant heat compatible with the weather conditions of Asia-Pacific countries. The main research results obtained in the 2008 FY are reported as follows.

Construction of climate chamber capable of producing velocity fluctuation using multiple fans

A climate chamber was constructed to enable us to systematically analyze the relationship between natural crosswind fluctuations, the amount of human sweat produced, and the human skin temperature. Figure 1 shows a plan view of the climate chamber and Figure 2 shows the interior of the laboratory inside the climate chamber. The climate chamber was designed to meet the following air-conditioning requirements: temperature range from 20 to 35°C ± 0.5°C, humidity range from 40 to 70% ± 2%, and wind velocity range from 0.1 to 2.0 m/s. The climate chamber is 5 m wide × about 11 m long × about 3 m high. It houses a laboratory 3.7 m wide × 8 m long × 2.7 m high, a pre-room, and a fan room. Figure 3 shows the airflow generator installed in the fan room. It consists of 48 plug fans driven by 280-W DC motors. Figure 4 shows the long-frequency fluctuations of the natural crosswind reproduced by controlling the revolution speeds of each motor from a desktop computer.

Thermal comfort experiment on sweating rate and evaporation rate from human subjects in a hot environment using climate chamber

We adopted a hot environment condition with the temperature set to 35ºC and the relative humidity set to 70% in the newly constructed climate chamber. The excreted sweat and the skin surface temperature on different parts of the human body, in relation to steady wind at various mean velocities, were investigated. There were considerable individual differences in the relationship between the amounts of sweat produced at different parts of the body and the variations of wind velocity. However, the results showed that the amount of sweat produced generally decreased as wind velocity increased.

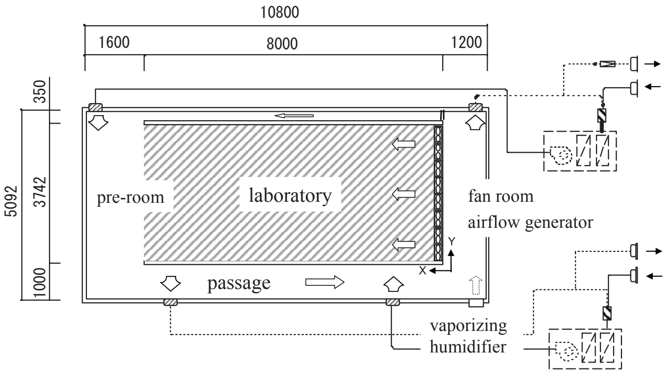


Figure 1. Plan view of Climate Chamber

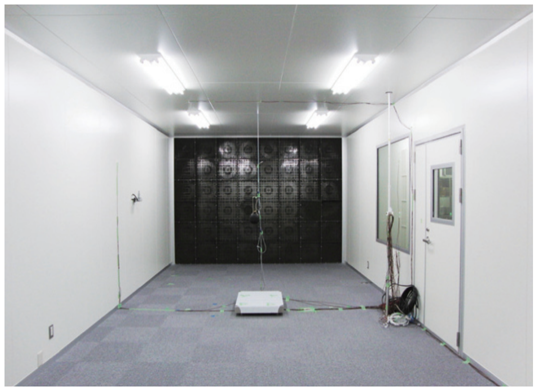


Figure 2. Interior of laboratory inside climate chamber

Figure 3. Fan room

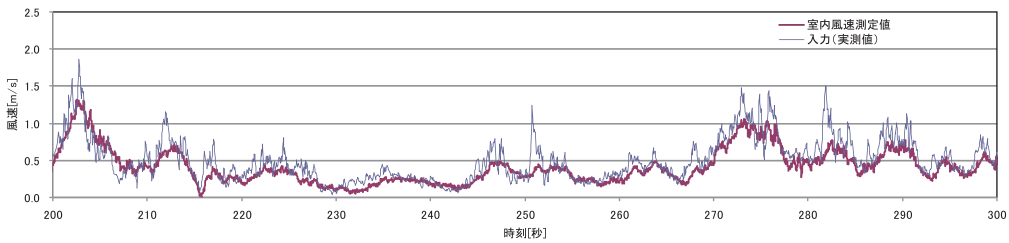


Figure 4. Reproduction of long-period fluctuations of natural crosswind observed in field experiments

Individual differences in the amount of sweat produced by the whole body were small in comparison to the individual differences in the amount of sweating at each part of the body. In addition, the effect of wind velocity on the amount of sweating on the body as a whole was minimal. The amount of evaporation from the whole body changed in proportion to the wind velocity and the evaporation rate decreased as the wind velocity decreased.

Study on energy saving simulation of cross-ventilated detached house by using a coupling network model

We carried out wind tunnel experiments to create a database of wind pressure and tangential dynamic pressure for a detached house located in a high-density area, and investigated the effect of building coverage ratios on these characteristics. Using a coupling network model, which is an integrated ventilation model (LDSM) based on local dynamic similarity theory, with COMIS and TRNSYS, a simulation study of cooling load was performed for the detached house. It was found that the cooling load was reduced by more than 50% by opening the windows while residents were asleep, even when the building coverage ratio was 40%.

Study on development of hybrid system for dehumidifying/cooling with natural draft

We developed a constant air volume natural ventilation system, which we ventilated with a constant air volume during both strong wind and breeze. The relation between wind pressure and quantity of damper wind were optimized by an experiment using a weight and a spring. A study of the dehumidification ventilation system with diatomaceous earth was carried out in an artificial climate room. The ability to dehumidify fresh air during sleeping time was confirmed if we used diatomaceous earth dried by solar heat during daytime.

Project 3 Outdoor Wind Environment

Wind tunnel experiments on urban ventilation

Air ventilation in urban areas is now broadly recognized as a countermeasure to the urban heat island phenomenon and air pollution problem, and it is becoming extremely important to ensure air ventilation in weak wind regions. Urban ventilation greatly depends on configurations of building groups in cities, and its effects were investigated by wind tunnel experiments. The Mong-Kok area in Hong Kong and the Shiodome-Shinbashi area in Tokyo were selected as representative coastal urban areas, and simplified city models of them were made for the experiments. Building coverage ratio, floor area ratio, and height variation of build ings of the city models were systematically changed and wind velocity and air temperature distribution within the street canyons were measured. Experimental results showed that when the building height was inhomogeneous, air ventilation, especially behind buildings and in the downstream region of the district, was greatly improved and air temperatures in the district decreased. This was because cool air above the cities was transported to ground level and the heat near the ground was effectively exhausted to the upper atmosphere.

It was also found out that seaside high-rise buildings did not necessarily aggravate the heat island phenomenon in leeward cities. Even if the sea breeze was blocked by many closely packed high-rise building groups forming a screen, the region where the wind velocity became weak and the air temperature increased was limited to the area immediately behind the high-rise buildings. In most leeward regions, air ventilation improved and air temperature decreased because of the downward flow from the tops of the high-rise buildings. Therefore, it is important to guide the upper breeze to the inside of the urban canopy to ensure not only a "horizontal ventilation path" but also "vertical ventilation paths."

CFD simulation of non-isothermal flow

"AIJ guidelines for practical applications of CFD to pedestrian wind environment around buildings" have been recently published, mainly targeted on strong wind problems around high-rise buildings. However, the urban heat island phenomenon and air pollution problems become serious in weak wind regions such as behind buildings and within street canyons. In order to apply CFD techniques to estimate air ventilation and thermal and pollutant dispersion in urban areas, it is essential to assess the performance of turbulence models in relation

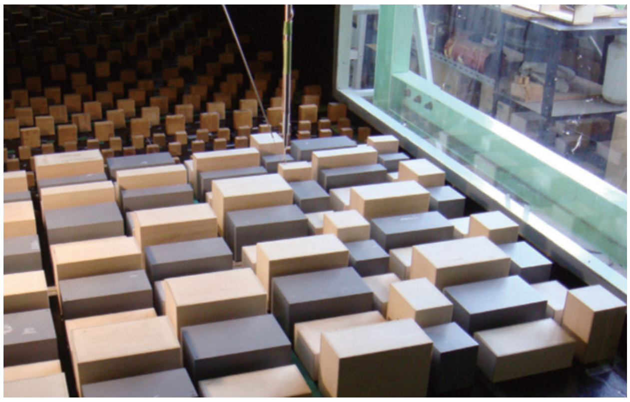


Figure 1. Wind tunnel experiment for a dense city in Hong-Kong.

Figure 2. Wind tunnel experiment for coastal city in Tokyo.

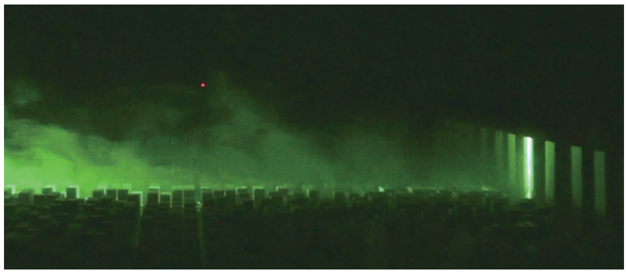
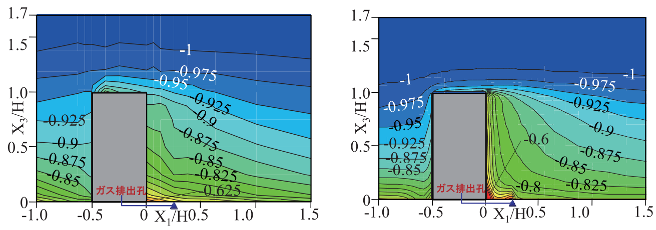
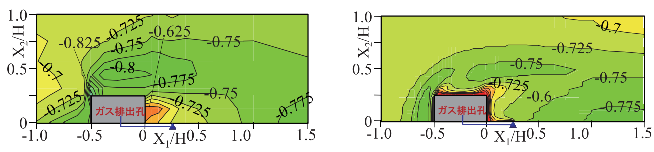


Figure 3. Visualization of "vertical ventilation paths" behind costal high-rise buildings.



(a) Experiment (b) CFD

Figure 4. Vertical distribution of gas concentration around a building.



(a) Experiment (b) CFD

Figure 5. Horizontal distribution of gas concentration around a building.

to these phenomena that occur in non-isothermal flows. However, there has been little validation of CFD for non-isothermal flows thus far in the field of wind engineering.

Thus, wind tunnel experiments and CFD simulations of gas and thermal dispersion behind a high-rise building in unstable non-isothermal turbulent flow were carried out. A standard k-ε model and a two-equation model for heat transfer were used as the investigated turbulence model in this study. The calculated results of these two models showed that there was little difference between them, and both overestimated the size of the recirculation region behind the building and underestimated the lateral diffusion of the gas. This was mainly because the periodic motions caused by the vortex shedding were not reproduced by either model, in spite of the unsteady calculation. Large Eddy simulation (LES) would be necessary to reproduce the periodic motion, and so we developed the LES code for non-isothermal flow. Now we are calculating the instantaneous inflow velocity and temperature fluctuations necessary for LES inflow boundary conditions.

Report on “Cooperative Actions for Disaster Risk Reduction (CADRR)”

Date: March 4-6, 2009
Venue:United Nations University, Tokyo, Japan

The three day symposium on “Cooperative Actions for Disaster Risk Reduction (CADRR)” was held as ISWE4 (4th International Symposium for Wind Engineering) at the United Nations University (U-Thant Hall, Photo 1) and was organized by the Global COE program of Tokyo Polytechnic University, United Nations University, UN/ISDR (UN International Strategy for Disaster Reduction), IAWE (International Association for Wind Engineering) and ADRC (Asian Disaster Reduction Center). There were 195 participants from 17 countries and they had useful discussions on disaster risk reduction over a wide range of natural hazards.

This provided a unique opportunity to facilitate interactions among various groups with diverse backgrounds but with a common focus on disaster reduction, and to highlight the issues surrounding wind-related hazard and its impact on constructed facilities and society at large. It was also noted that other hazards such as ocean waves, storm surge, heavy rains, flooding, landslides, lightning, fires and heat waves are directly or indirectly associated with winds around the globe and should be treated in a holistic manner rather than each in isolation. On the first day of the forum participants from different backgrounds gained an appreciation of other hazards and how they related to one another.

On the first and second days of the symposium, representatives of each area delivered lectures on disaster risk reduction in their area. Titles of the invited lectures are listed below:

- Trends in Disaster Losses [Claudia Buholzer Rosenkranz (Munich Re.)]
- Tornadoes and Severe Local Storms [Thomas Schmidlin (Kent State University)]
- Heavy Rain-Flood Hazards and Their Integrated Management [Soontak Lee (Yeungnam University, Korea)]
- Impact and Damage from The 2004 Indian Ocean Tsunami [Fumihiko Imamura (Tohoku University)]
- Implementation of Safer Non-Engineered Houses by Technological and Social Approaches [Kimiro Meguro (IIS, Japan)]
- Disaster Risk Reduction Trends on Landslide in Indonesia [Dwikorita Karnawati (Gadjah Mada University)]
- Heat-Waves around the World [Joe Golden (NOAA)]
- Disastrous Fires in Several Forest and Wild land in The World [Hiroshi Hayasaka (Hokkaido University)]
- Meteorological Hazards – Trends and Statistics

[Geoffrey Love (WMO)]
- Reconstruction of Houses in Aceh Post Disaster Mitigation Opportunities [Teddy Boen (Indonesia)]
- Hurricane Katrina in The US, 2005 [Timothy Reinhold (Vice President, Institute for Business & Home Safety)]
- Cyclone “Sidr” in Bangladesh [Tai-ichi Hayashi (Kyoto University)]
- Cyclone Nargis in Myanmar, May 2, 2008 [U Win Zaw (Ministry of Construction, Myanmar)]
- Damage and Loss of May 12, 2008 Wenchuan Earthquake [Zifa Wang (Director, Institute of Engineering Mechanics, China Earthquake Administration)]
- The World Meteorological Organization’s Disaster Risk Reduction Activities [Geoffrey Love (WMO)]
- UNU Activities - Developing Local Capacity – [Srikantha Herath (UN University)]
- Activities by Asian Disaster Reduction Center (ADRC) [Etsuko Tsunozaki (ADRC)]
- Activities in International Center for Water Hazard and Risk Management [Amithirigala W. Jayawardena (ICHARM)]
- Next Frontiers of Innovation, Discovery and Learning in Wind Engineering: A Cyberinfrastructure Perspective [Ahsan Kareem (University of Notre Dame), Tracy Kijewski-Correa, Yukio Tamura and Greg Madey]
- Wall of Wind Project [Forrest Masters (University of Florida)]
- COST C26: Urban Habitat Constructions under Catastrophic Events [Ted Stathopoulos (Concordia University)]
- Wind Disasters and Risk Reduction Activity in India [Prem Krishna (IIT Roorkee)]
- Managing Financial Risks due to Natural Catastrophic Events [Haresh Shah (Founder, RMS)]
- Role of ODA and JICA in Disaster Risk Reduction [Noriaki Nagatomo (JICA)]
- Earth Observations and Forecasting in Disaster Reduction –GEOSS [Ryosuke Shibasaki (University of Tokyo)]
- CADRR of the Disadvantaged [Muhammad Saidur Rahman (Director, Bangladesh Disaster Preparedness Center)]

On the second day of the symposium, immediate collaborations among area-specific academic associations (AA) and international organizations (IO) working in disaster risk reduction (DRR) at societal level materialized. It was noted that closer communications and inputs from AAs to IOs working on DRR and reconstruction areas are essential for their relative effectiveness. It was concluded that post-disaster activities must be well coordinated to reflect the ground realities, e.g., need for medicines, clothing and food must be critically evaluated by a central organization and conveyed to the donors to avoid arrival of unnecessary aid at the site only to stifle the moribund infrastructure in the wake of a disaster. The discussions during the symposium emphasized the need for such a critical arm of the disaster risk reduction group to take charge in steering post disaster investigations, distribution of essential goods and recovery and other related efforts. The following section provides a preamble and objectives of such a group under the auspices of UN.

Photo 1 United Nations University

Photo 2 Welcome address by Prof.Tamura

Report on “The Third International Workshop on Natural Ventilation”

Date: March 16, 2009
Venue:AIJ Hall

“The Third International Workshop on Natural Ventilation” was held at the AIJ hall on March 16, 2009. This workshop was organized by Tokyo University of Science, Building Research Institute and Tokyo Polytechnic University Global COE program. Its aim was to share information on natural ventilation, and to attempt development on further studies and practices in this field. The 1st workshop was held at Tokyo Polytechnic University and the 2nd at AIJ hall in 2005.

The 3rd workshop comprised twelve lectures including sessions on Policy and Strategy, Ventilation Mechanics and Thermal Comfort, and Heat Load and Application, and each was followed by active discussion.

The lecture titles are outlined below:

Policy and Strategy

- Willem de Gids (TNO Built Environment and Geosciences, The Netherlands) Advanced ventilation systems in classrooms
- Yuguo Li (University of Hong Kong, China, Hong Kong) Natural Ventilation for Infection Control in Health Care Facilities
- Takao Sawachi (Building Research Institute, Japan) Estimation of Energy Consumption for Cooling and Ventilation in Houses -A Newly Introduced Japanese Regulation to Evaluate Energy Consumption for Heating, Cooling, Ventilation, Hot Water and Lighting
- Martin Liddament (VEETECH Ltd, University of Warwick Science Park, UK) The Applicability of Natural Ventilation

Ventilation Mechanics and Thermal Comfort

- Takashi Kurabuchi (Tokyo University of Science, Japan) Domain Decomposition Technique Applied to Evaluation of Cross-Ventilation Performance of Opening Positions of a Building
- Per Heiselberg (Aalborg University, Denmark) Buoyancy Driven Natural Ventilation through Horizontal Openings
- Hisashi Kotani (Osaka University, Japan) Paper Review of Cross-Ventilation Research - Results from Activities of Working Group for Natural Ventilation and Cross-Ventilation in AIJ-
- Richard de Dear (University of Sydney, Australia) The Theory of Thermal Comfort in Naturally Ventilated Indoor Environments: “The pleasure principle”

Heat Load and Application

- Masaaki Ohba (Tokyo Polytechnic University, Japan) Simulation Study on Reduction of Cooling Loads in Detached House by Cross-Ventilation Using Local Dynamic Similarity Model
- Shigeki Nishizawa (Building Research Institute, Japan) Verification of Effect of Cross Ventilation on Energy Conservation by the Experiment Simulating Occupant Behavior
- Mat Santamouris (University Athens, Greece) Efficiency of Night Ventilation Techniques
- Yuichi Takemasa (Kajima Technical Research Institute, Japan) Natural Ventilation with Dynamic Facades - Japanese Examples -

Studies on natural ventilation were presented by 6 foreign speakers and 6 Japanese speakers, and there were 80 participants in this workshop.

Report on "the 5th International Advanced School on Wind Engineering" (IAS5)

Date: March 23-25, 2009
Venue:Izbicko Palace, Opole, Poland

The 5th International Advanced School on Wind Engineering was held at the IZBICKO PALACE, Opole, Poland from 23rd to 25th March, 2009. It was co-hosted by the Global COE Program at Tokyo Polytechnic University, Japan and the Opole University of Technology, Poland. Its aim was to present and share the latest information on wind load, wind disaster, and structural aerodynamics, and to express opinions on further studies and practices in this field. The school participants, 46 persons in total including 9 lecturers invited by Professor Yukio Tamura and 37 PhD students, engineers, and researchers from Europe who work in relevant scientific research or design topics, and who came from Germany, Italy, Netherland, and Poland.

The lecturerers and the titles of their lectures were as follows:

Chiiming Cheng

1. Along-wind design wind load for tall buildings (I): Results of wind tunnel tests
2. Along-wind design wind load for tall buildings (II): A modified analytical model

Tadeusz Chmielewski

1. Measurements of wind-induced response of tall slender structures using GPS
2. Wind-induced responses of a tall chimney with and without flexibility of soil

Yaojun Ge

1. Bluff body aerodynamics applications
2. Long-span bridge aerodynamics

Ahsan Kareem

1. Computational tools for wind engineering
2. Computational tools for wind engineering
3. Control of wind-induced responses

Kenny C.S. Kwok

1. Aerodynamics of tall buildings
2. Habitability of buildings to wind-induced motion

Chris Letchford

1. Extreme wind phenomena and their climatology
2. Topographic effects on extreme winds
3. Debris flight and impact criteria

Ted Stathopoulos

1. Understanding of wind codes and standards: fundamentals behind their provisions
2. Understanding of wind codes and standards: fundamentals behind their provisions
3. Pedestrian wind comfort: experimental and CFD approaches

Yukio Tamura

1. Damping in buildings 1
2. Damping in buildings 2
3. Monitoring techniques in wind engineering

Youlin Xu

1. Field measurements of tall buildings in high winds
2. Wind and structural health monitoring of long span bridges

Photo 1. Lecturers and participants of IAS5

Photo 2. Lecturers of IAS5

Report on "ROOMVENT 2009"

Date: May 24-27, 2009
Venue:BEXCO Convention Hall, Busan, Korea

ROOMVENT 2009 (The 11th International Conference on Air Distribution in Rooms) was held in Korea, BEXCO Convention Hall in Busan in Korea over four days from May 24 to 27, 2009.

ROOMVENT had been held in Sweden, Denmark, etc. every two or three years since 1987, and this conference was the 11th. More than 300 people including 40 Japanese participated, and 7 Keynote Speeches, 10 Forums and about 260 technical papers were presented.

A Keynote Speech was given by Prof. Jong Soung Kimm after the Opening Ceremony, and two lectures were given at the beginning of each morning's plenary session.

The titles of the Keynote Speeches are outlined below:

- Jong Soung Kimm: Traditional Architecture & Recent Contemporary Buildings in Korea
- Francis Allard: Prediction of contaminant concentrations in indoor environments
- Qingyan Chen: CFD for Simulating Air Distribution in Buildings: The State of the Art, Challenges, and Opportunities
- Jan Sundell: Ventilation and health
- Kwok Wai Tham: Impacts of temperature and ventilation on people - beyond comfort and health
- Takao Sawachi: Estimation of Cooling Energy Reduction by Utilizing Cross-Ventilation in Detached Houses, within the Japanese Newly Introduced Energy Regulation Evaluating Energy Consumption for Different Uses
- Bjarne W. Olesen: Criteria used in international standards for specifying required ventilation rates.

The titles of Chair and Forum are outlined below:

- Yuguo Li: From RoomVent to CityVent: - How to ventilate a city effectively?
- Qingyan Chen: Air distribution, thermal comfort, and contaminant transport in commercial airliner cabins.
- Peter V. Nielson: Virtual CFD manikins - The Development of CFD manikins for Predicting Thermal Comfort and Air Quality.
- Hiroshi Yoshino: Ventilation in schools.
- Hazim Awbi: Efficiency of room air distribution systems (RADS).
- Yingxin ZHU: What is 'comfort', neutral, amenity or health? - Discussion on thermal comfort standard in dynamic thermal environment.
- Francis ALLARD: Need for a performance based ventilation standard.
- Shinsuke Kato: The germicidal performance of UVGI system in buildings.
- Mats Sandberg: Rapid Variation of Ventilation and Convective Cooling - Can it improve indoor environmental quality?
- Fariborz Haghighat: Airflow modeling - requirements and Challenges

Launch of the International Group for Wind-Related Disaster Risk Reduction

During the second session of the Global Platform (GP) for Disaster Risk Reduction that took place in Geneva, Switzerland during 16-19 June 2009, an International Group for Wind-Related Disaster Risk Reduction founded by TPU Global COE, IAWE, UN/ISDR Secretariat, UNU, ADRC and SEEDS was launched under the framework of United Nations International Strategy for Disaster Reduction (UN/ISDR).

Wind-related disasters such as Cyclone Nargis in Myanmar in 2008 and Cyclone Sidr in Bangladesh in 2007 have had significant impacts on our society, especially in terms of the shocking number of deaths and injuries to people and the attendant property loss. It has been reported that 80-85% of natural disaster economic losses in the world are caused by extreme wind related events, and it is hypothesized that global warming has the potential to further exacerbate this scenario through an increase in the number and intensity of weather-related disasters. However, in the past UN/ISDR framework, there was no professional organization focusing on Wind-Related Disaster. Although some wind-related organizations like the International Association for Wind Engineering (IAWE) have been effectively working to develop technologies, codes and standards for wind hazard mitigation, there has been a lack of coordinated activities with international groups like the UN and NGOs to bring these technologies to work for less fortunate communities in low lying coastal areas of the world. Unfortunately, these localities are often struck by devastating wind storms like hurricanes/typhoons that are responsible for escalating loss of life and associated perils they bring to the region. In order to address this emerging and critical issue, there is a need for establishing an International Group for Wind-Related Disaster Risk Reduction to facilitate implementation of the Hyogo Framework for Action in the area of wind-related disaster risk reduction.

Wind-Related Disasters, e.g., tropical cyclones, are generally accompanied by storm surge, heavy rains, floods, landslides and lightning. This has created a pressing need for pooling of expertise and for cooperative actions to reduce losses from various types of natural disasters. Despite recognition of this critical need for cooperative actions in Wind-Related Disaster Risk Reduction (WR DRR) activities among various professional organizations, there has been no notable collaborative effort among the various groups in the past.

During CADRR (Cooperative Actions for Disaster Risk Reduction) held in Tokyo in March 2009, the participations of the representatives from TPU-GCOE, IAWE, IAEE, UN-ISDR, ADRC, WMO, NOAA and others reached a consensus that there is a critical need to establish an International Group (IG) to work on Wind-Related DRR. The main task of this group will establish linkages and coordinate various communities, e.g., IAWE, to serve as inter-agency coordinators with a charter to work with international organizations involving agencies of the UN and involved NGOs, and to embolden their activities that help to serve as a bridge between policy makers and agencies responsible for actually carrying out the DRR at the local community level. All its efforts are directly related to the implementation of the Hyogo Framework for Action in the area of wind-related disaster risk reduction.

The main expected activities of the International Group for Wind-related Disaster Risk Reduction include:

- to implement the Hyogo Framework for Action in the area of wind-related disaster risk reduction;
- to establish a database/warehouse of the latest information/technologies relevant to wind-related effects and their mitigation;
- to facilitate technology transfer that attends to the needs of local communities exposed to disasters around the world;
- to provide assistance to international organizations in the preparation of guidelines to manage the impact of wind-related disasters including evacuation, recovery and reconstruction;
- to organize, dispatch and facilitate ground logistics for quick-response post-disaster investigation teams;

- to establish an international consensus for extreme winds based on damage relevant to different construction practices;

- to establish international guidelines to prepare for wind-related disaster reduction activities;

- to harmonize wind-loading codes and standards including environmental specifications;

- to facilitate development of a global Engineering Virtual Organization (EVO) for Wind-Related Disaster Risk Reduction; and

- to hold international workshops/conferences on WR DRR. (The International Forum on Severe Local Storm Disaster Risk Reduction for Bangladesh has been scheduled in 2009.)

The existing platforms, APEC Wind Engineering Network, Wind Engineering Research Center at Tokyo Polytechnic University and EVO VORTEX-Winds initiated by NatHaz Modeling Laboratory at the University of Notre Dame, will play important roles in promoting these activities. Strong wind measures relevant to each country's situation can be discussed through these platforms or face to face in the annual workshops of APEC-WW. Currently, 15 countries/regions have joined the APEC-WW, and more countries will join this year. Organized post-damage activities can be coordinated through this Network to avoid overlapping disaster investigations and excessive, unnecessary rescue supply which often become a burden for local communities amidst a disaster. In addition, education and transfer of advanced wind hazard mitigation technologies to developing typhoon/cyclone-prone countries can be carried out through these platforms. The output of this group will be reported at GP every two years.

Currently this group for Wind-Related Disaster Risk Reduction includes the representatives from IAWE (International Association for Wind Engineering), ICHARM (International Center for Water hazard and Risk management), UN/ISDR (International Strategy for Disaster Reduction) Secretariat, ADRC (Asia Disaster Reduction Center), UN-Habitat (The United Nations Human Settlements Programme), UNU (United Nations University), WMO (World Meteorological Organization), IFRC (International Federation of Red Cross and Red Crescent Societies), TPU Global COE (Global COE Program at Tokyo Polytechnic University) and SEEDS (Sustainable Economical & Environmental Development Society). IAWE President serves as the Chairman of this group with the IAWE Secretariat as the Secretariat. More members are expected to join in the future.

Announcement

Future events are scheduled as follows.

5th Workshop on Regional Harmonization of Wind Loading and Wind Environmental Specifications in Asia-Pacific Economies (APEC-WW 2009)

Date: November 12-14, 2009

Venue: Tamkang University, Taiwan

International Forum on Severe Local Storm Disaster Risk Reduction for Bangladesh

Date: December 13-14, 2009

Venue: Dhaka Sheraton Hotel and Bangladesh Meteorological Department, Dhaka, Bangladesh

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