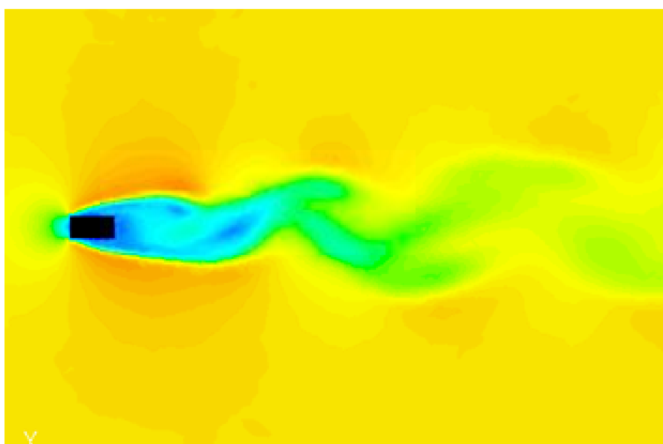
Volume 12, No.1, February 2010

WIND ENGINEERING SOCIETY

Newsletter

Dr. Graham Knapp, Editor

Contents:



WES Research Day

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❖ Chairman's Column

John Owen, University of Nottingham

2009 from the Wind Engineering Society perspective can probably best be described as interesting. It has certainly been a mixed year. On the technical front we have enjoyed some excellent events, the highlights for me being the one day conference on the EuroCodes and the Scruton Lecture. The high standard of these events plus the large interest shown by members and non-members has been a great encouragement. However, these successes have been overshadowed by the ongoing wrangling over the relationship between the ICE and the Associated Societies.

The Wind Engineering Society is an Associated Society of the Institution of Civil Engineers. This is a valuable relationship for us as it provides us with secretariat support, membership services and access to Central London meeting rooms at a subsidised cost. Previously, the ICE has offered a subsidy of 75% to Associated Societies, but in May 2009 we were informed that this subsidy was to be cut to 50% from 2010, effectively doubling the running costs of the Society overnight. As a small Society with limited income and limited funds we are particularly hard hit by this change in circumstances.

Some of our fellow Associated Societies (BGA and RCEA in particular) have been very effective in coordinating a robust response to these proposals, which culminated in a request for a Special General Meeting of the ICE in December. This triggered a series of meetings with the ICE President, which will in turn hopefully lead to a solution to the problems we face. My thanks to Tom Wyatt and David MacKenzie for fighting the Society's cause at these meetings.

Overall, 2009 has confirmed to me the value of the Wind Engineering Society, but also highlighted the acute need we have to increase both our activity and membership. To do this we need you and your active participation. Please encourage your colleagues to attend meetings and especially to join the Society. If you have a burning issue you want covered at one of our technical meetings, please let us know. If there are things you think we could do better or should do differently, again please let me know.

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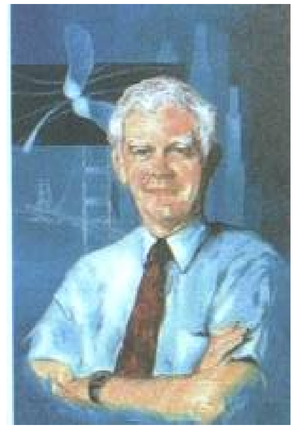
WES NEWSLETTER

Volume 12, No. 1: February 2010

❖ Alan Davenport

The genius of Alan Davenport - a personal appreciation **Tom Wyatt**



Alan Davenport died on July 19, 2009. This is not an obituary - I have four excellent obituaries on my desk as I write - but a personal memoir of a man who was an inspiration for nearly 50 years of my own career. They were, of course, 50 years that spanned the development of wind engineering as we know it - indeed, we will shortly be celebrating 50 years of the ICWE international conference sequence that started from the NPL symposium 'Wind Effects on Buildings and Structures' of June 1963. I believe that it is salutary to reflect on the nature of wind engineering 'before Davenport' (indeed, wind engineering only entered the ICWE titles at Fort Collins in 1979).

In 1959 my employer, Freeman, Fox, was in dialogue with control specialists at Imperial College concerning system requirements and stability of drive of the ground-breaking 64m-diameter alt-azimuth mounted antenna for CSIRO, Australia. This was still the pre-digital era and drive centred on an analogue servo from a mechanically-driven equatorial master. Not only did the drive design require a time-history of wind resultant action about a diameter, but even the language was foreign to civil engineering - 'spectra', what were they? We did have digitised data from Sherlock's vertical anemometer array at Ann Arbor, and these were integrated, by hand. Alan entered this scene to obtain the records from the Sharpness (Severn) Bridge anemometer array, while working up his PhD with Pugsley at Bristol, but I doubt if they were much help - miles of multi-pen chart, inaccessible because AD chart reader/converters were still in extreme infancy.

In 1961 this world changed with Alan's ICE paper 'The application of statistical concepts to the wind loading of structures', followed in 1962 by 'The response of slender linelike structures . . .' that addressed spatial correlation (although his QJRMetSoc paper on the turbulence spectrum itself in April 1961 was actually the first to appear). Spatial correlations had also been a major issue in the investigation following the 1962 collapse of the Tyne Crossing Tower, giving me a background that illuminated dialogue with Alan, notably at the 1964 Large Antenna Symposium at the New York Academy of Sciences, especially concerning rival merits of spectral and non-spectral approaches to static-action correlation. It was, however, beyond argument that Alan had brought to fruition an approach that revolutionised our understanding of wind gust action on structures, which has fully stood the tests of time.

There was, of course, work in hand elsewhere. The Electrical Research Association (ERA) in the UK came concurrently into this field, in pursuit of wind energy, and its contribution developed rapidly; 1st ICWE, NPL1963, contained consecutive papers on gust loading by Alan and by Ian Harris from ERA, with the latter pursuing a more mathematical presentation. The ERA programme was taken up as the biggest item in the portfolio of the Civil Engineering Research Association (subsequently CIRIA), in times when fund-matching by government was almost automatic. This, of course, led to the Harris and Deaves wind structure, developed into the ESDU items that now underpin many of the applications of Alan's principles.

Ian joked at this stage was that he had spent much cerebral effort on bringing mathematical rigour to Alan's intuitive short-cuts, only to find that Alan's proposals stood up very well in practical terms. This is, of course, saying that Alan was a 'real' engineer with exceptional judgement and grasp of both principles and practicalities. His ability to tackle complex structures was brilliantly shown in dynamic gust response analysis of guyed masts; I would argue that his 'single substitute mass' model of stay dynamics can give better insight than we often get with all-singing 3D software having full 'TΔ' capability.

Practicality extended into codification. Martin Jensen's paper on the Danish Code immediately preceded Alan's in 1st ICWE; Alan built a close relationship with Martin, and code formats soon appeared that are still prominent, not least in EN1991-1-4. 'B' and 'R' components of response - that is Davenport notation. However, concurrently the second revolution was in progress and 2nd ICWE, Ottawa 1967, included Alan's paper (with Nick Izumov) 'The application of the boundary layer wind tunnel to the prediction of wind loading'. We were then able to visit UWO to see the revolutionary 25m rough-floor tunnel in action. The impact on design of very tall buildings needs no comment, but it is worth remembering Alan's pioneering collaboration with Leslie Robertson for the New York WTC - a contact that we are told stemmed from a study with Cermak at Colorado State in 1964.

In later years I paid particular attention to Alan's integration of climate, location and building parameters in the overall design-acceptance process. His Rutherford Lecture at the Royal Society, London (1987) was a revealing simple generalisation of this synthesis, but never got properly published. In the nineties, we also watched his work on measures to mitigate the effects of extreme natural events, 'disaster mitigation'.

One of the sad consequences of the current pace and volume of publication is that in the electronic reference bases, the real key works , including those mentioned above, are covered by the proliferation of derivative papers, and are cited less often than they should be. Of course, the direct influence of the UWO BLWT on tunnel practice world-wide is undiminished. The in-house Davenport team remained a remarkably stable group, but the key advances were clear to see. The Ken Anthony Fellowship tenable at UWO, sponsored by Arup in memory of their lead wind engineer at the start of the Davenport era, not only recognised Alan's status but helped spread the messages. Everyone concerned with wind effects on buildings and structures (and they are not, most of them, wind engineers in our specialist sense) are in Alan's debt.

❖ Codes and Standards

Eurocode on Wind Actions (BS EN 1991-1-4) — ***Brian Smith***

An amendment to the Eurocode on Wind Actions was created in July 2009 which should be circulated to the UK Mirror Committee in September. It is believed this incorporates the changes to the roof coefficients as requested by the UK but a draft amendment has not been circulated – as far as I know.

Published Document for the Wind Action Code (PD66881-1-4)

The final draft was sent to BSI in July 2009 for publication. It is a 63 page document (including the replacement for Annex E of the Eurocode). The Mirror Committee are awaiting the BSI draft for final approval.

Eurocode on Steel Towers, Masts and Chimneys (BS EN 1993-3-1, BS EN 1993-3-2)

The NA for BS EN 1993-3-1: Towers and masts was approved by the B/525/32 Committee at a meeting in July 2009, and the published version by BSI is awaited.

At the same meeting it was agreed that the NA for BS EN 1993-3-2: Chimneys would be abandoned and no NA would be produced. The chimney industry considered it unlikely that they would use the Eurocode – preferring the CICIND documents. As most clients are in the private sector this was deemed a rational decision.

Re-organization of BSI Committees

BSI are proposing to re-organize their Committees to reflect the format of the Eurocodes. Thus 'specialised' structures will have no home.

Maintenance of Eurocodes

Working Groups are being set up to deal with the maintenance of the Eurocodes. It is unlikely that there will be any funding for such groups.

❖ WES Event reports

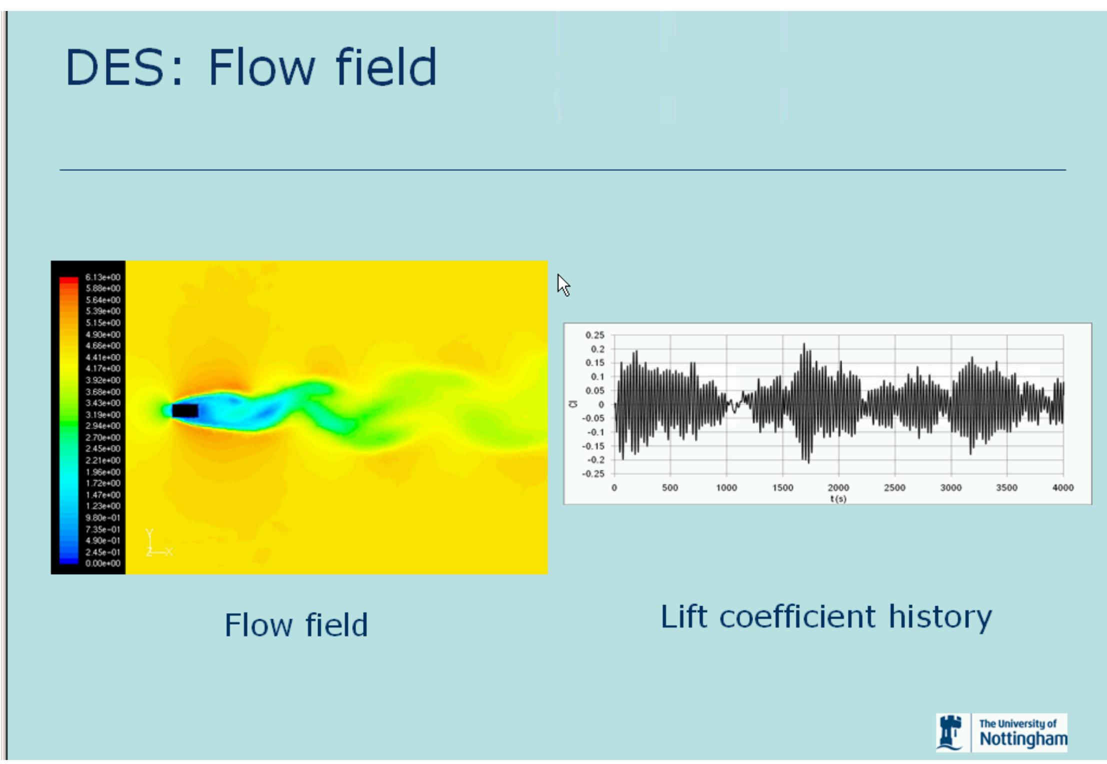
Scruton Lecture

With approximately 175 attendees at this year's lecture and at least 50 online viewers, this was our best-attended Scruton Lecture yet. Indeed, some of the online viewers were projecting to a wider audience so this is probably an underestimate. In any event, well over 200 engineers were treated to an excellent presentation by Svend Ole Hansen, covering his long experience of studying wind effects on slender and long-span structures.

WES Research Day

Dr John Owen, WES Chairman

Every two years WES holds a half day meeting at which postgraduate students and other researchers can show case their research work. At the 2009 event on October 28th six presentations were made covering a range of different wind engineering problems from the urban wind environment to the simulation of debris flight. The presentations were excellent and stimulated a good deal of discussion, both during the session and afterwards over tea and biscuits. The prize for the best presentation on the day was awarded to Miss Julia Revuz for her presentation, "Numerical Simulation of the Dynamic Wind Loading on and Response of Tall Buildings". This year we endeavoured to attract greater participation from the industrial sector, which is important to influence the future direction of wind engineering research. Unfortunately, this proved difficult to accomplish but we hope the next event will feature a more dynamic interaction between researchers and practitioners. Abstracts for five of the presentations are included below."



Slide extracted from the winning presentation by Julia Revuz, University of Nottingham

WES Research Day Abstracts

Dependence of surface drag on the density and layout of rectangular buildings

Anil Padhra, Reading University

Aerodynamic characteristics of urban areas determine vertical profiles of wind and turbulence within the atmospheric surface layer. Accurate modelling of such profiles is needed for application to wind load calculation, pedestrian comfort, weather prediction and pollution dispersion. In urban areas, characteristics of the wind profile are dependent on the size, shape and spatial distribution of buildings. Parameterizations of the urban surface drag are often expressed in terms of the density (expressed either as plan or frontal area density) of groups of buildings. In this study, the contributions of these two parameters to the surface drag and roughness have been determined. Wind tunnel measurements have been made for a range of building packing densities equivalent to suburban and dense urban areas. Integral momentum analysis has been applied to the measured data to calculate surface drag. In addition, the sensitivity of the drag on rectangular structures to wind direction and layout has been investigated.

CFD-RBD Modelling of Wind-borne Debris Aerodynamics

Bruce Kakimpa, University of Nottingham

While a variety of wind engineering codes exist to aid in the structural design of buildings, according to Minor (1994) extensive evaluations of building performance in wind storms have shown that wind borne debris is one of the effects, previously not considered in design that leaves the building envelopes vulnerable. In order to address this problem, debris damage models and risk assessment models have been proposed, which rely on estimates of debris trajectories and impact kinetic energy obtained from analytical models of debris flight.

These analytical models, such as Richards et al., (2008), predict the 2D and 3D trajectories of plates based on the principles of linear and angular momentum conservation. However, they are currently limited by not fully accounting for the non-linear Fluid-Structure Interaction (FSI) effects and the unsteady turbulent flow phenomena that develop around the plate.

This study presents a coupled Computational Fluid Dynamics (CFD) and Rigid Body Dynamics (RBD) approach to the prediction of the flight trajectories of wind-borne plate-type objects in a uniform wind stream. Unsteady 2D and 3D Reynolds Averaged Navier-Stokes (RANS) CFD models are used to simulate the unsteady flow phenomena in the environment of: static; forced rotating; auto-rotating; and free-flying plates (Kakimpa et. al., 2009). Instantaneous plate aerodynamic forces are obtained from the CFD code which is sequentially coupled with a 3D Rigid Body Dynamics code that compute the plate translation and rotation. This coupling allows a study of the FSI behaviour of the plate and how this influences plate motion. Results have been validated against old and new experimental data from ESDU (1970) and Martinez-Vazquez et al. (2009).

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Simulation of the wind induced forces acting on a cereal plant

Pedro Martinez-Vazquez, University of Birmingham

Lodging, the permanent displacement of cereal stems from the vertical (Pinthus, 1973), drastically affects profitability through lower yield and reduced grain quality. Widespread lodging occurs on average once every four years and it is estimated that the severe lodging in 1992 cost growers up to £130 million pounds through loss of yield alone. The exact causes of lodging are difficult to quantify, however, it is generally agreed that the interaction of the plant with the characteristics of the rain, wind and soil are all of great importance: Rain increases lodging risk by decreasing soil strength and increasing the load which the plant must bear. Wind then induces a bending moment which displaces the plant often leading to buckling of the stem, in addition the turbulent coherent structures present in the wind, induce a forced oscillation which serve to complicate the problem and weaken the root structure.

The present investigation reviews the problem making use of a sophisticated technique for the simulation of turbulent wind in a 2D space. This simulation is then used in conjunction with a synthetic plant database and a numerical model capable of representing the motion of a crop. The latter is based on an approximation originally developed by Baker (1995) and implemented in the frequency domain. In the current work the equation of motions are solved in time domain and the simulated wind field is applied as force excitation. This approach enables a more accurate prediction of the motion of the plant and hence the forces acting on it. Preliminary results show that the modelled plants behave elastically - far below the limits given by the yielding property of the stem material, and that up to 35% of the plant's population exceeded their root capacity which induced failure of the plant.

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Wind Direction Effects on Urban Flows: an LES Study

Jean Claus, University of Southampton

In research on flow characteristics in urban areas, recent studies have used uniform cube arrays - Fig. 1(a) - as simple models of an urban canopy [1, 2, 3, 4]. In most of these studies, however, the flow direction was normal to the faces of the cubes - 0° and 90° on Fig. 1(b). To investigate the effects of the wind direction, Large Eddy Simulations have been conducted with forcings at 45° and 63°. The flow variables are time-averaged and then spacially averaged in horizontal layers so as to obtain a single vertical profile per variable. The results show that the mean flow is strongly deviated from the direction of the forcing. In fact, in the bottom half of the canopy, the flow is quasi-aligned with the 90° direction independently of the direction of the forcing - Fig 1(c) - and the velocity field at the cubes' mid-height for the 45° case shows little difference with the 90° case - Fig. 1(d). For a 90° flow, it was shown that the top of the building is responsible for most of the pressure drag and that the viscous contributions are of the order of 5%. The 45° flow, however, displays a much more uniform profile - Fig. 1(e) - and the viscous drag represents 20% of the total drag, which raises the issue of Reynolds number independence. Finally, the spanwise pressure difference for both the 45° and 63° flows - Fig 1(f) - shows a spanwise 'lift' that can only be balanced by opposing viscous forces, suggesting again the importance of the viscous contributions.

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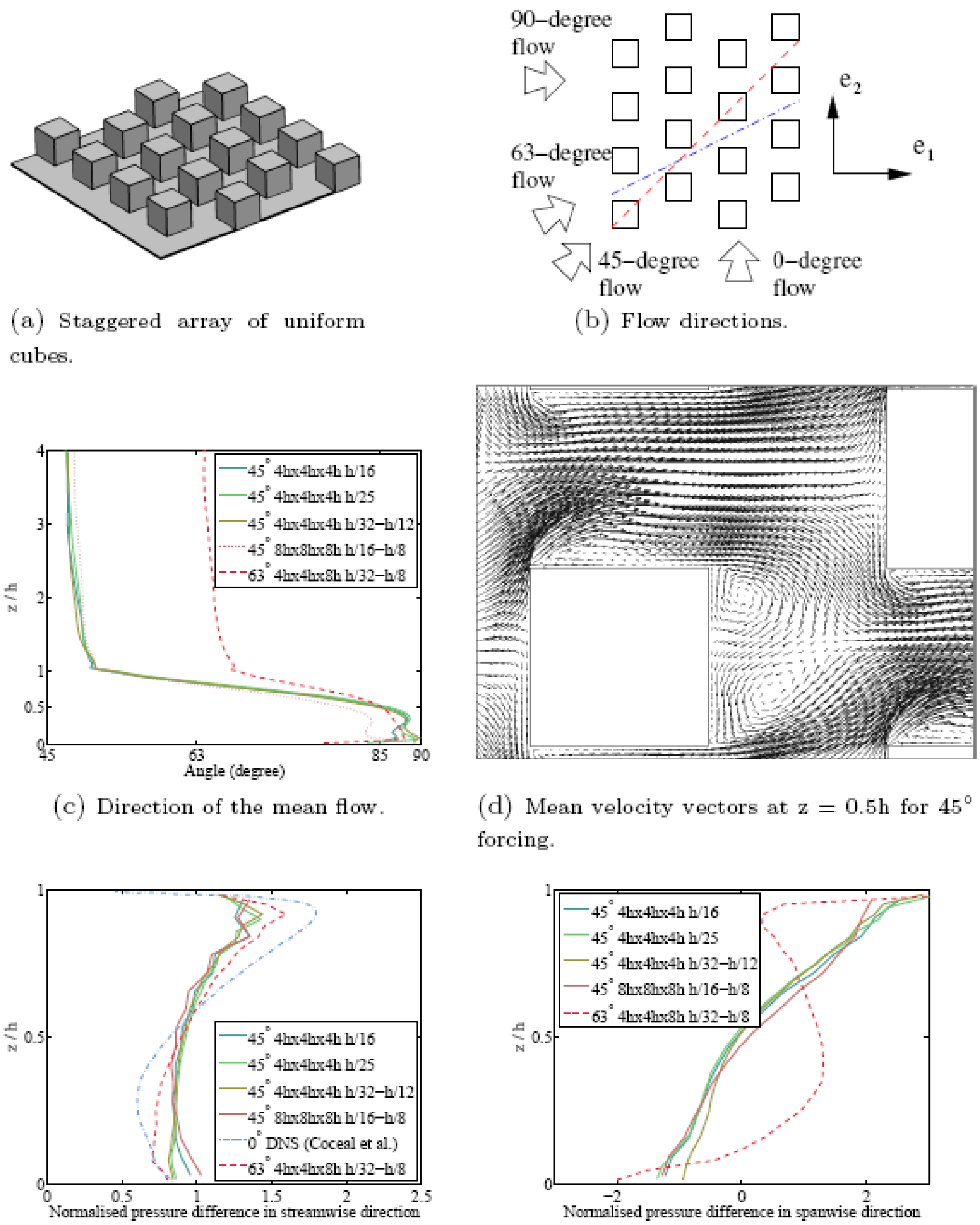

(a) Staggered array of uniform cubes.

(b) Flow directions.

(c) Direction of the mean flow.

(d) Mean velocity vectors at z = 0.5h for 45° forcing.

(e) Streamwise pressure distribution.

(f) Spanwise pressure distribution.

Fig. 1. Cube array and LES results. The legend format is: forcing direction - domain size - cell size, with h is the cube height.

Numerical Simulation of the Dynamic Wind Loading on and Response of Tall Buildings

Julia Revuz, University of Nottingham

Wind action is particularly important for tall buildings, both in providing a significant contribution to the overall loading on the structure and by affecting its serviceability. With respect to the latter, the dynamic response of tall buildings can become a significant issue if the motion is sufficient to cause occupant alarm or discomfort. Whereas low and medium-rise buildings are fairly rigid, tall structures are characterized by a greater flexibility and a lower natural frequency, which is more likely to be in the frequency range of wind gusts. Vortex shedding occurs for many bluff bodies, but can become a significant problem for flexible structures when the vortex shedding frequency is close to the natural frequency of the building. This can lead to a substantial dynamic response that influences the fluid flow so that the building response frequency controls the vortex shedding frequency in a phenomenon called lock-in. In recent years much research has been carried out into the numerical simulation of wind loads on structures and in coupling Computational Fluid Dynamics (CFD) to dynamic models of structural response. The rapid increase of computer speed and memory capacity has allowed the use of simpler, but computationally more demanding, turbulence models. This has led to more accurate simulations, especially for the prediction of wind flow around buildings. In the present paper the authors will present a study on simulating the dynamic response of a tall building to wind excitation.

The method used to solve this fluid-structure interactions problem is sequential. The equations for the air flow are solved using the commercial CFD program ANSYS-Fluent. The response of the structure is found from solving the structural domain; here the authors have adopted a modal approach, the response in each vibration mode being treated as a SDOF problem. An Arbitrary Lagrangian Eulerian formulation is used in solving the Navier Stokes Equations so that mesh motion is fully accounted for. The mesh is divided into 2 regions, a rigid region that moves with the structure without deforming and an outer region that deforms using elastically. This method is applied to a 60m cantilever. Two turbulence models are compared in the present work: an unsteady RANS based model is compared to the Detached Eddy Simulation, which combines the SST RANS turbulence model near the cantilever and in most outer regions and LES in the wake to resolve smaller turbulence length scales.

The results of the simulation of the flow around a 60m cantilever using the DES method show better flow field characteristics than a k-ε model. More importantly, the DES method is able to capture and maintain unsteady phenomena such as vortex shedding, which is essential for coupling the flow solver with the dynamic response of the building. The previous exposed results prove that it is feasible. Besides, the dynamic cases showed that CFD and the structural solver were successfully coupled; the simulation with the dynamic model is able to capture the lock-in phenomena. The validation of the fluid-structure coupling is on-going and will be based on 60 m tower located in the main campus of the University of Nottingham. Experiments are scheduled to start in June 2009. In addition, full-scale data are available for a 370 m building in Hong-Kong and will be used for validation purposes of the numerical results.

Another important aeroelastic phenomenon is due to wind gusts and causes along-wind excitation for the building. To model this phenomenon wind gusts need to be input, which involves the use of realistic turbulent inflow. This can be done using techniques to generate turbulent inflow, such as the one recently developed by Xie and Castro (2008). Combining a dynamic structure with turbulent inflow will be part of future work.

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❖ CROSS Reports

NEWS ITEM

At a music festival in Derbyshire three people were injured when strong winds lifted part of the roof off the stage. The event went on despite the incident which included neck, back and shoulder injuries and a suspected broken wrist. A number of people were also treated for shock. A witness was quoted as saying: "The supports from the marquee were ripped out from the ground and the wires broke".

CROSS comments: This happened in mid May and soon after the collapse of a large lightweight fabric covered practice facility for the Dallas Cowboys at the beginning of the month when 12 were injured. (The same month in Malaysia the roof of a one year old 50,000 seat stadium collapsed.) In both cases high wind events were mentioned by observers.

Also in May the creator of an inflatable artwork which blew away killing two women was fined £10,000. He was convicted at Newcastle Crown Court of breaching the Health and Safety at Work Act by failing to ensure the safety of members of the public. Chester-le-Street Council, which carried out a safety check prior to the exhibit opening admitted breaching the Act and was fined £20,000. A useful summary of this incident may be found in the Safety and Health Practitioner July 2009 p41-42.

There are hazards for the designers, suppliers, erectors, and checkers of temporary structures, and lightweight structures, which may be exposed to high winds, and of course for users and members of the public. These hazards must be recognised so that construction is suitably robust. Advice on all aspects is given in the publication 'Temporary Demountable Structures: guidance on procurement, design and use', published in 2007 by the Institution of Structural Engineers.

CRITICAL GABLE WALL FAILURE

There has been a report about the top triangle of a brickwork gable in a relatively modern building collapsing in high winds and very seriously injuring two passers by. The reporter believes that the cause was a lack of ties between the brickwork and the adjoining timber trusses.

Contractors, says the reporter, come under the remit of the CITB (Construction Industry Training Board), and some of their courses on general safety might help. He goes on to say that it is however an entirely different matter getting small contractors to give up the time and earnings necessary for such training, and it seems to him that this is an element that should be pushed strongly forward. He imagines that to have a realistic effect government money would have to be found to pay people to go on such courses, not merely to subsidise the direct costs. There might well be, he considers, a significant payback in a reduction in deaths and injuries, not to mention in prosecution costs after the event.

CROSS comments: Gable walls must be properly tied to resist wind suction. The Approved Document for Part A of the Building Regulations (paragraphs 2C36 and 37 and diagram 16) shows the tying that is required by means of tension straps at not more than 2m centres at the top of a gable wall and at the level of the bottom of the roof trusses. Guidance is also given in BS 5628 Code of Practice for the use of masonry and in Eurocode EN 1996. However any lack of restraint straps or adequate fixings should be evident on an inspection of the roof space, even though access may be difficult, but there is no requirement for this type of inspection to be carried out by a Building Control Body.

The number of inspections carried out by Building Control Bodies is currently (2009) under review. The frequency of inspections is linked to risk assessment but there should be greater emphasis on the risks associated with inadequate restraint for the benefit of all involved. Training and advice at many levels is given by CITB. As a leading member of the Sector Skills Council, ConstructionSkills understands the needs of employers and workers to ensure a safe, professional and fully qualified workforce. They provide advice, courses and funds for training to help improve construction businesses. (http://www.cskills.org/).Notwithstanding, it is incumbent upon those constructing the building to ensure the work is adequately supervised.

Robustness in general will be dealt with in a forthcoming report from the Institution of Structural Engineers (due in 2010). (Report 135)

UNDERPASS CEILING COLLAPSE

This was an underpass for cars and pedestrians to access the central courtyard of a residential complex. The soffit of the structure was finished with an internal suspended ceiling construction anchored to the concrete soffit. The ceiling was boarded and rendered. Six months after handover and whilst the residential building was inhabited there was a total collapse of the ceiling structure. It is believed that the failure was caused by wind suction. Fortunately it happened late at night and there were no injuries. The ceiling was replaced by a structural frame of cold rolled steel.

CROSS comments: It is fortunate that most collapses reported to CROSS have occurred at night or other times where no one has been underneath. Indeed this represents one of the strengths of the scheme in that trends can be detected before the headline cases of deaths and injuries from structural failures. However the information is only of value when action is taken and it may be timely to give more publicity to the SCOSS alert on secondary fixings http://www.scoss.org.uk/publications/rtf/SCO8048A-Alert%20-Fixings-Final.pdf (Report 140)

❖ Future WES Events

At the Institution of Civil Engineers, One Great George Street London SW1P 3AA, unless otherwise stated

Wind effects on trains

17 March 2010

Convenor: Dr Nick Waterson Mott MacDonald Ltd

Speakers:

Terry Johnson (RSSB) - Open issues regarding trains in crosswinds

Don Wu (Mott MacDonald) - Review of CFD application to trains in crosswinds

Hassan Hemida (Birmingham University) - Application of LES to train aerodynamics

Wind, Climate and Middle Eastern Architecture

Wednesday 12 May 2010

Convenor: Dr Graham Knapp, Buro Happold Ltd.

Speakers:

Dr Bernardo Vazquez, Buro Happold

Dr Anne Coles, University of Oxford

❖ Other Events

Adapting our cities for future climates

Wednesday, 17th February 2010

Blackett Lecture Theatre 1, Imperial College, South Kensington Campus, London, SW7 2AZ

http://www.rmets.org/events/abstract.php?ID=4360

More than 50% of the world's population is now estimated to live in urban areas, and the figure is set to rise dramatically, especially in developing countries. Cities generate their own microclimates, the best known of which is the urban heat island, where the city centre can be several degrees warmer than the rural surroundings. For large cities like London, urban climate needs to be taken into account in urban design, especially given that South East England regional temperatures are predicted to rise, and heatwaves like 2003 will be become more frequent. This meeting will include talks on the latest observations and simulations of urban climates, and the policy and practice needed to adapt to future urban climates.

Confirmed speakers

- Sylvia Bohnenstengel, University of Reading and LUCID project
- Alex Nickson, Greater London Authority
- Dr Mark McCarthy, The Met Office
- Dr Gerald Mills, University College, Dublin
- Dr Mark Sterling, University of Birmingham

❖ Forthcoming Conferences

International Events

Fifth International Symposium on Computational Wind Engineering (CWE 2010)

Chapel Hill , North Carolina , USA

May 23-27, 2010

http://www.cwe2010.org

Thirteen International Conference on Wind Engineering (ICWE13)

The Netherlands, Amsterdam

2011

http://www.icwe13.org/

9th UK Conference on Wind Engineering, Bristol

20-22 September 2010

http://www.bris.ac.uk/Depts/Wills/pictures/garden.jpgThe conference aims to continue the friendly informal tradition of WES conferences, with papers covering the full range of wind engineering topics and a good mix of research and practice. The programme will include a tribute to Tom Lawson 1925-2009, who made many contributions to the field of wind engineering in his time at Bristol.

The venue is Wills Hall, University of Bristol, set in attractive grounds not far from the Avon Gorge and Clifton Suspension Bridge, about 2 1/2 miles from the city centre.

Further details will be available shortly on the conference web site:

www.bris.ac.uk/civilengineering/wes-2010

Conference organisers: John Macdonald, Melissa Burton

Administrator: Nina Bunton Email: wes-2010@bristol.ac.uk Tel.: 0117 331 8304

Important dates

Abstracts due 22 January 2010

Notification of acceptance 1 March 2010

Extended abstracts (4 pages) due 28 May 2010

Deadline for early registration 28 May 2010

Conference dates 20-22 September 2010

Thomas Vincent Lawson, FREng, 1925-2009

The programme will include a tribute to Tom Lawson, who made many contributions to wind engineering in his time at Bristol University. Papers relating to his work will be particularly welcome

Call for Papers

We welcome papers on any relevant subject associated with wind engineering including, but not limited to:

- Wind characteristics
- Extreme winds
- Wind environment
- Meteorological studies
- Consequences of climate change
- Atmospheric dispersion
- Human comfort
- Wind tunnel / test methods
- Computational wind
- engineering / CFD
- Model, full scale or desk studies
- Bluff body aerodynamics
- Wind loading
- Fluid-structure interaction / Aeroelastic effects
- Tall buildings / Bridges / Long-span roofs / Cladding
- Cable vibrations
- Wind effects on vehicles
- Codes and standards
- Risk analysis
- Case studies / Applications

WES NEWSLETTER

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13th International Conference on Wind Engineering

July 10-15, 2011 Amsterdam, The Netherlands

The wind engineering community in the Netherlands and Flanders is very pleased to cordially welcome you to Amsterdam for the next International Conference on Wind Engineering. Amsterdam is the capital of a country with a long history in wind engineering, as demonstrated by the large number of windmills used in land reclamation. The conference is intended to gather researchers and engineering consultants who will share the latest results of research and successful case studies in which wind is a relevant engineering and design phenomenon. The field ranges from fluid dynamics, applied meteorology, wind energy, civil engineering and city planning to design of cladding and roofing. This broad field makes this conference an interesting gathering place for all parties involved in wind-related engineering and design. The venue is very much worth visiting and a social programme organised during the conference will include cultural and historical highlights.

We are looking forward to welcoming you.

Chris Geurts, Conference Chairman

info@icwe13.org www.icwe13.org

Tel: +31 (0)20-589 32 32

Key dates

Submissions open for 4-page abstracts	Early 2010
Deadline for 4-page abstracts	Mid 2010
Notification of acceptance	Late 2010
Deadline for 8-page full paper	Early 2011

CWE 2010, Chapel Hill, May 2010

Call to Attend and Register Online (www.cwe2010.org) by March 1, 2010 for the Early Rate.

Fifth International Symposium on Computational Wind Engineering, May 23-27, 2010

William and Ida Friday Center for Continuing Education, Chapel Hill, North Carolina, USA

More than 320 oral platform and poster technical presentations are expected from attendees representing over 30 countries. Each technical session with oral platform presentations will include time for questions. There will be technical sessions where poster presenters will be given a few minutes to introduce orally their poster, followed by a viewing period. Accepted Abstracts are now posted on the CWE2010 Web site www.cwe2010.org .