UK Wind Engineering Society

[January – May 2014]

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Chairman's Column

by John Kilpatrick

Welcome, WES members, to the latest edition of a refreshed WES Newsletter! It has been several years now since we published a newsletter to membership, and we have Dr. Ender Ozkan and others to thank for a major contribution to this effort.

There have been many changes at WES since I took over the role of Chairman in May 2012, some of which I'd like to re-cap and share with you. In one of my first actions as Chairman, I welcomed many of you to the 10th UK WES Conference on Wind Engineering which took place in Southampton. The conference was a great success, with many visitors from abroad commenting that the all-in-one session format allowed them to experience aspects of wind engineering they might overlook at larger conferences. Well done, Dr. Glyn Thomas et al. who organized the event! Dr. Alex Michalski and colleagues were awarded Best Conference Paper at the conference for a paper entitled "Computational Wind Engineering of Large Umbrella Structures". Alexander's paper combined the best of academic research and current industrial practice, embodying the society's key objectives. Alexander received a free annual membership to WES and a small financial prize. A Best Paper award with similar prizes will be presented at the conclusion of all future biennial WES conferences.

The 11th WES Conference will be held 8-10 September, 2014, at the University of Birmingham. Two page abstracts are now invited, with submissions due on 14 February, 2014. More details are provided on the conference website, which I encourage you to view at http://www.hembex.co.uk/wes2014/. I look forward to seeing many of you at this event.

I am pleased to announce that Professor Mark Sterling of the University of Birmingham was nominated for the role of Vice-Chairman of WES, and was accepted by the WES committee in September 2013. He will be taking on the role of Chairman when my own term expires, in the not-too-distant future.

The WES Young Researchers' Day (formerly the Graduate Research Day) was post-poned in 2013, and convenient dates in 2014 conflict with other major ICE and IStructE conferences. The WES Young Researchers' Day will therefore be next held in September 2015, with the venue likely to be the ICE HQ in London. The event will be open to post-graduate students and young graduate engineers from industry. In addition to the reconfigured research day, student membership in the Wind Engineering Society has recently been reduced to nil. That's right, free! A real bargain, so what's stopping you graduates from joining?! Joining instructions are available here: http://www.windengineering.org.uk/subscriptions.php . If we can get a significant influx of new (and renewed) members amongst students and young engineers, we would like to create a Young Wind Engineers' group within WES, to facilitate communication, help further your careers in wind, and get sound advice from colleagues in WES. Get in touch if you are interested in taking part in this exciting project!

We will be celebrating new Fellows of the Wind Engineering Society in 2014. It has been 10 years since individuals were nominated for Fellowship. In retrospect, this is an oversight. Appointment as a Fellow can be either to (a) reward exceptional achievement or (b) honour a record of service within the Wind Engineering profession. Fellows have the highest grade of membership in our society. A list of nominations was received by the committee in late 2013, and is currently with the WES Committee for approval. News about the Fellowship presentations will be broadcast to membership in the coming months via our LinkedIn group and e-mail.

I do hope you enjoy the new WES newsletter. It's been a long-time in the making and we've tried to keep it brief and relevant. There are interesting summaries of recent wind storms in the Philippines and the UK, a discussion of the recent Scruton lecture given by Dr. Ahsan Kareem, and In The Spotlight this newsletter is Dr. Tom Wyatt, a long-time Fellow of WES and Visiting Professor at Imperial College.

Enjoy!

St Jude Autumn Storm

by John Kilpatrick

An Atlantic storm raced across a significant area of southern England on 28 October 2013, St. Jude's Day. Winds gusted across southern England at 50-60 knots and reached 60-70 knots across coastal areas of south-east England. The highest recorded gust speed was 86 knots (almost 100 mph) at Needles Old Battery just off the Isle of Wight.

Most of the damage from the strong winds was related to falling trees. A total of 4 people were killed by falling debris, in Kent country, Watford and west London. Power was lost at over 600,000 residences. The storm is judged to be one of the top ten most severe autumn storms to affect southern England in the last 40 years. Judging by the photo on the right we suspect it was also the craftiest storm in recent times.

If you have articles and news snippets you would like to share about interesting wind-related events please contact the editorial team via the channels on the last page of this newsletter.

Crane brought down by high winds on the roof of Cabinet Office, Whitehall, 28/10/2013 (AP Photo/Kirsty Wigglesworth).

Where's Fido? A dog-shaped root ball seen at the base of the felled oak tree in Alexandra Park, Ipswich, Suffolk (Photo: Archant Suffolk)

FOR MORE INFORMATION

A more detailed assessment of the storm can be found via the following links to the Met Office website.

http://www.metoffice.gov.uk/climate/uk/interesting/2013-octwind

http://www.metoffice.gov.uk/media/pdf/s/n/18.5_PaulDavies.pdf

Tom Wyatt – In the Spotlight

Tom Wyatt is a Fellow of WES and one of our most respected experts. His contributions to wind engineering, bridge aerodynamics and wind-induced fatigue of structures are highly regarded across the world.

Q: What drew you to Wind Engineering? My employer's instructions! The conventional suspension bridge post-Tacoma was truss-stiffened with deck composed of short panels that were wholly parasitic as far as the crucial torsional stiffness was concerned. My employer was following a long trail towards improved efficiency, to which end I shuttled between the office and secondment to Kit Scruton at NPL Aero. Concurrently we were also reshaping the structural form of the steerable paraboloid radiotelescope, for which the drive torque requirement is the differential wind load across the diameter of a circle. Statistical inference from time history records from an anemometer array on a mast (in digital hard-copy in 1959) was cutting-edge work pre-Davenport. Alan did actually appear in our office in the hope of using data from our horizontal array at Sharpness – vain hope, given miles of multi-colour pen records.. Wind engineering has brough me the most felicitous contacts and friendships.

Q: Who were your gurus? Obvious, what a privilege to get (and stay) close to those two at such an early stage.

Q: Life-changing inputs? Almost equally obvious, Davenport Proc ICE 1961/1962/1964.

Q: What prompted a move to academe? Moving to academe, my ambition was to expand these procedures for direct use by designers. This resonated with enthusiasm on foundation of the WES and its affiliation with the ICE to promote wider appreciation of our discipline. I find it greatly frustrating that so many of my structural designer colleagues remain complaisant that reading the Code of Practice is sufficient without making the effort to explore the underlying principles. SECED seem to have greater success, despite the more limited field of impact in contrast to the almost universal impact of wind actions.

Q: Frequency-domain versus time-domain analysis? One bias that I have carried right from the radio telescope work is a preference to stay firmly out of the frequency domain for evaluation of 'background', 'broad-band' gust action. Latterly I have been surprised at the lack of take-up of orthogonal decomposition of pressure data, a procedure that I hoped would support and enhance this bias, especially given the fantastic advances in wind tunnel capability for collection of pressure data. Potentially, I saw a door opening for the designer to properly integrate his influence lines with the experimental data, however fancy they may be for (say) a complex cable roof, within a conventional management of load cases. Despite my belief that the designer should be able to follow the treatment of correlation in a conventional 'direct' analysis, it is a clear barrier both conceptually and in computation which we have not hitherto overcome. I may add that I am less gripped by the frequency-domain extension of orthogonal decomposition, telling myself that a reasonably robust picture of the dynamic mode properties required for the 'narrow bands' usually emerges early on, so the tunnel lab can make explicit evaluation, but equally this caution may just be a reflection of my inability to cope with the magnitude of the number-crunching.

Q: Are you I happy with the prospects for wind engineering and the WES? This is not the place to rant about the problems of academic support and funding, or of the evils of the publication explosion and its impact on the academic career path, so I close with a more specific gripe. The impact of advances in tunnel technology has been overwhelmingly in the commercial sector, and the gripe is that this business has become too financially competitive. This erodes the possibility of extracting broader benefit from studies of a quality and sophistication unattainable even twenty years ago, because they are essentially ad-hoc, and probably dead a fortnight after the boxes have been ticked. Another need for education, this time for the client-paymaster.

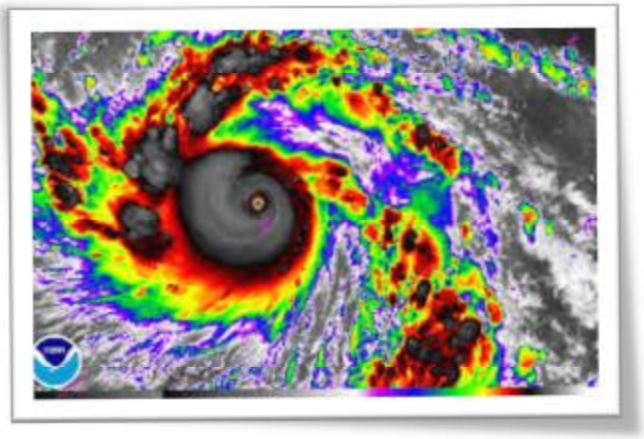
Typhoon Haiyan

by Ender Ozkan

For many of us November may seem like so long ago, but residents of Philippines are still reeling from the effects of Typhoon Haiyan that hit the island on 7th of November 2013. We take a look back at what made this typhoon one of the worst tropical disturbance in the area for decades, and the current situation in affected parts of Philippines.

There were several unusual features of Haiyan which made it stand out from other typhoons that have been observed in northwest Pacific;

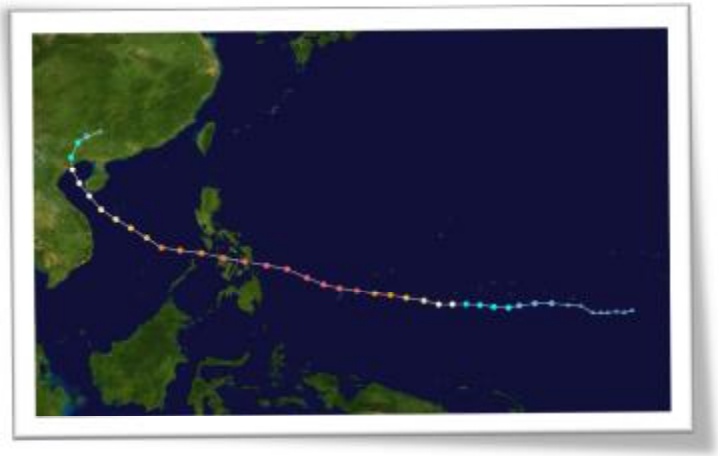
- The rate with which Haiyan gained intensity was highly unusual, developing from a tropical depression on the 4th of November to a category 5 typhoon on 6th of November.



- The path of Haiyan was also not common. Most typhoons in the area hit central or southern Vietnam, whereas Haiyan made a direct hit on northern Vietnam and continued its destructive path towards Guangxi of China.

- The speed of Haiyans core was considerably faster than most typhoons in northwest Pacific, reaching up to 50 kph at times (while most other typhoons travel at somewhere between 15kph to 35kph).

- Finally, and most significantly, Haiyan was the strongest typhoon on record to hit Philippines, and possibly the strongest typhoon ever to make landfall. Even after being disrupted by the mountainous regions of Phillipines, Haiyan emerged on South China Sea as a category 4 cylone.



The official death toll stands at 6,190, with over 4 million displaced and entire villages reduced to rubble. Although several months have passed since the event, the region is still recovering from the disaster and battling with ensuing housing shortages and health problems. A measles outbreak has been recorded in the National Capital Region as three of the eight hospitals in Tacloban have not been operational, leading to medical shortages. Disasters Emergency Committee continues to seek donations to help provide shelter and medical support to those affected (text DEC to 7000 to donate £5 or help online at www.dec.org.uk)

FOR MORE INFORMATION

A more detailed assessment of the storm can be found via the following links to the Met Office website.

http://en.wikipedia.org/wiki/Meteorological_history_of_Typhoon_Haiyan

http://www.ospo.noaa.gov/Organization/History/imagery/Haiyan/index.html

http://www.who.int/features/2013/tacloban-christmas/en/

2014 WES Scruton Lecture

The Changing Dynamic of Bridge Aerodynamics

by John Rees

This year's Scruton Lecture was given by Dr Ahsan Kareem, the Robert M Moran Professor of Engineering at the University of Notre Dame, Michigan, USA. He has received numerous honours, but of particular relevance to the wind engineering community are the *ASCE's J. E. Cermak* and *R. H. Scanlan Medals* and IAWE's *A. G. Davenport Medal* for contributions to dynamic wind load effects on structures. Dr Kareem is also a past President of the ASWE.

Dr Kareem started the lecture by noting that its subject was very dear to Scruton and one of his key areas of professional activity, initially linking aerofoil theory to the design of bridges and developing its application through wind tunnel testing. Flutter derivatives were first postulated by Scruton in 1957 and the Scruton Number (a non-dimensional mass-damping parameter) is routinely used in any assessment of vortex shedding. Furthermore, Scruton was instrumental in bringing dynamic design into mainstream civil engineering design practice.

Dr Kareem challenged engineers to think beyond conventional fully developed atmospheric boundary layer models for wind loading and consider other mechanisms such as thunderstorms and tornadoes. Both of these mechanisms are significant climatic loads in the USA. Whilst probabilistic models are appropriate in well behaved climates, other approaches are needed to deal with such extraordinary winds.

Dr Kareem noted that procedures based on linear, stationary, homogeneous, steady and Gaussian assumptions had served the long span bridge engineering community well. However, these would not suffice if spans were to increase and set new records. He believed that the development of non-stationary and non-linear procedures would be the principal changing dynamic in long span bridge design. He proposed that such methods would need to include factors for kinematic effects, rise-time effects, non-stationary turbulence effects and transient aerodynamics.

Furthermore, established methods based on Fourier transforms would no longer apply if a signal was changing its frequency with time. Dr Kareem advocated the use of wavelet transformation methods to address this issue. Whilst the longest bridge span is currently 1991m (Akashi Kaikyo), spans up to 3,500m (e.g. Gibraltar Straits) are postulated. The wind engineering design of such spans would be dominated by coupled effects, low stiffness & damping, structural & material non-linearity, and aeroelastic & aerodynamic non-linearity.

Dr Kareem's called his preferred new approach the 'white box' method. This built on the linear models currently in use but could be extended through the addition of first and second order effects. By using complex mapping rules (static linear/nonlinear relationships) and time lag (fluid memory effects) between the aerodynamic/aeroelastic inputs and outputs, it may be possible to represent buffeting, flutter and vortex shedding by the superposition of scaled and time shifted fundamental responses. This offered a unified approach to the analysis of response to wind.

Dr Kareem presented a fascinating insight into his group's research activities and the developments (both current and potential) in advanced non-linear methods for dealing with bridge aerodynamics. A recording of the lecture can be viewed through the Events and Conferences section of the ICE's website. Anyone who is interested in the subject matter but was unable to attend is encouraged to view the video.

Ahsan Kareem with WES members after the 2014 WES Scruton Lecture.

FOR MORE INFORMATION

Check out the following link for access to the previous WES talks.

http://www.windengineering.org.uk/

UK Wind Engineering Conference

8 – 10 September, 2014
Birmingham, UK

1st Announcement & Call for Papers

WES will hold its 11th Biennial Conference in September next year, covering all aspects of the effects of wind on structures and the built environment. WES conferences have a well-deserved reputation for being friendly and informative meetings where researchers, consultants and designers from around the world can come together to share knowledge and experience. Please put this in your diary and register your interest at www.wes2014.co.uk where you can also find more details and keep up to date.

We are inviting short 2-page abstracts to be submitted by Friday 14th February on any wind engineering related topic, including

- Wind Structure
- Classification of Storms
- Wind loads on Structures
- Urban Wind Effects
- Wind Energy
- Ventilation
- Tunnel Flows
- Transport & Dispersal of Pollutants
- Full Scale & Model Scale Measurements
- Computational Methods
- Vehicle Aerodynamics

The venue will be the University of Birmingham, which has excellent facilities, accommodation and meeting rooms all on the same site. We look forward to seeing your abstract and to welcoming you to the conference next year!

For more information, visit the conference website (www.wes2014.co.uk) or e-mail the organizer (Paul Freathy) at wes2014@hembex.co.uk

Key Dates

- Abstracts: February 14th 2014
- Papers: June 2014
- Conference September 8-10 2014

Legendary* Wind References

There are many 'legendary' wind engineering articles buried in our libraries, most of which cannot be accessed online. With the help of our members we are compiling lists of 'legendary' articles that are worthy of a trawl through your library if you are working in one of these interesting fields.

If you have a list of 'legendary' references you would like to share with other members please feel free to contact the editor at wes@ice.org.uk.

[* Legendary status is given to those articles that have met the unidentified criteria set by our anonymous panel of 'experts'.]

Early Days of Wind Speed and Boundary Layer Characterization

1) Busch, N.E. and Kristensen, L., (1976). Cup Anemometer Overspeeding. J. Appl. Meteorol., 15, 1328-1332.

2) Gumbel, E.J.: 1958, Statistics of Extremes. Columbia University Press, New York, 375 pp.

3) Kaimal, J.C., Wyngaard, J.C., Izumi, Y. and Cot´e, O.R. (1972). Spectral Characteristics of Surface Layer Turbulence. Quart. J. Roy. Meteorol. Soc., 98,563-589.

4) Davenport, A.G. (1964). Note on the Distribution of the Largest Value of a Random Function with Application to Gust Loading. Proc. Inst. Civ. Eng. (London), 28, 187-196.

5) Panofsky, H.A. and Dutton, J.A. (1984). Atmospheric Turbulence. John Wiley & Sons, NY, 397 pp.

6) Kaimal, J.C., Clifford, S.F. and Lataitis, R.J. (1989). Effect of Finite Sampling on Atmospheric Spectra. Boundary-Layer Meteorol., 47, 337-347.

UK Wind Engineering Society [January – May 2014]

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Upcoming Events

WES Evening Lectures

- 12 March 2014, Wind Induced Fatigue
- 12 May 2014, Health Monitoring of Bridges: Bosporus Suspension Bridge
- 19 November 2014, Wind-induced Risk: Perspectives from the Insurance Industry

WES 2014 Conference, 8-10 September 2014

Announcements

New WES Communications Officer Wanted:

In a continuing pursuit to improve communication with its members, WES is looking for a young and energetic communications officer to oversee the different tools at WES' disposal. This will be a paid position with the following benefits;

- Join WES committee meetings and participate in the various WES activities,
- Interact with wind engineers from the industry and academia,
- Become the editor in charge of the WES Newsletter, and manage the LinkedIn and Twitter communication channels.

If interested please send an e-mail to wes@ice.org.uk with your details.