TORQUE

The Science of Making Torque from Wind

POLITECNICO
MILANO 1863

DIPARTIMENTO DI
SCIENZE E TECNOLOGIE
AEROSPAZIALI

POLI-Wind

eawe
european academy of wind energy

Milano, Italy
20-22 June 2018

Content

Welcome Message from the Conference Chair

Dear Colleagues, dear Friends,
welcome to the Science of Making Torque from Wind (TORQUE 2018) Conference!

TORQUE 2018 is the seventh edition of a biennial conference series, organized for the first time in 2004 by the European Academy of Wind Energy (EAWE) in Delft. Since then, it has become a reference point for the international wind energy community; an opportunity where Academia and Industry can discuss together, present research progress and, thanks to the networking events, establish new collaborations.

TORQUE 2018 has been organized by the Department of Aerospace Science and Technology of the Politecnico di Milano under the auspices of EAWE. All papers submitted have been subjected to a two-stage peer review process, which included the review of a three-pages abstract followed by the review of the full paper. Accepted papers have been grouped in six technical sessions, each organized by four leading experts in the field who also act as co-editors of the proceedings. In addition, over 100 reviewers helped in ensuring the quality of the papers. Finally, the conference proceedings are published by IOP in the open-access Journal of Physics: Conference Series (JPCS).

The conference offers 108 oral presentations in parallel sections and also 135 interesting poster presentations divided into two plenary sessions. The Conference Program also includes a plenary talk and a panel discussion and, last but not least, several social events, which allow delegates to have opportunities for networking.

I look forward to welcoming you to TORQUE 2018!

Alessandro Croce
Conference Chair of TORQUE 2018

Committees

Organizing Committee

Alessandro	Croce	Conference Chair
Stefano	Cacciola	
Laura	Dalzini	
Cristina	Giannetto	
Maria Rosaria	Pagano	
Carlo E.D.	Riboldi	
Luca	Sartori	

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Sandrine	Aubrun	France
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Lorenzo	Battisti	Italy
Ervin	Bossanyi	UK
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Kim	Branner	Denmark
Philippe	Chatelain	Belgium
Takis	Chaviaropoulos	Greece
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Fernando	Porté-Agel	Switzerland
Flemming	Rasmussen	Denmark
Vasilis	Riziotis	Greece
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Carlos	Simao Ferreira	The Netherlands
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Gerard J.W.	van Bussel	The Netherlands
Jan-Willem	van Wingerden	The Netherlands
Spyros	Voutsinas	Greece
Simon	Watson	The Netherlands
Frederik	Zahle	Denmark

Sessions

Topics

Organizers

AA. Aerodynamics and
Aeroacoustics

Philippe Chatelain (UCL)
Takis Chaviaropoulos (NTUA)
Carlos Simao Ferreira (TU Delft)
Flemming Rasmussen (DTU)

CM. Control and Monitoring
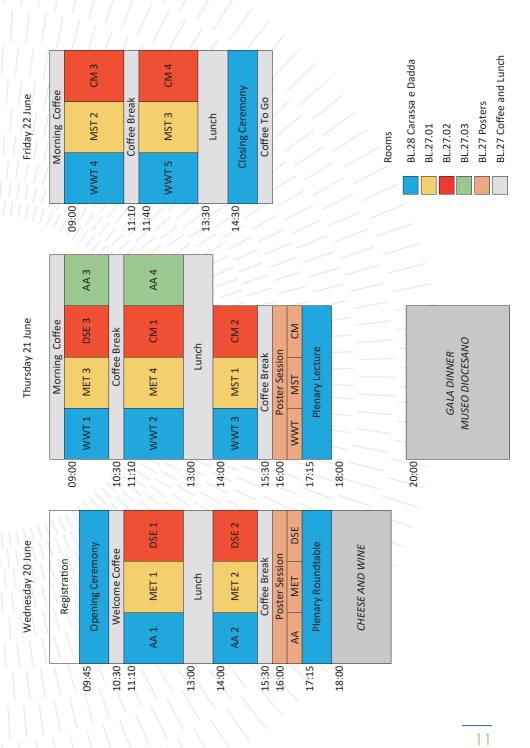
Ervin Bossanyi (DNV GL)
Po Wen Cheng (USTUTT)
Paul Fleming (NREL)
Jan-Willem van Wingerden (TU Delft)

DSE. Design, System Engineering
and New Concepts

Carlo Luigi Bottasso (TUM)
Katherine Dykes (NREL)
Joshua A. Paquette (SANDIA)
Frederik Zahle (DTU)

WWT. Wind, Wakes and
Turbulence

Stefan Ivanell (Uppsala)
Fernando Porté-Agel (EPFL)
Jens Nørkær Sørensen (DTU)
Spyros Voutsinas (NTUA)

MST. Modeling and Simulation
Technology

Morten Hartvig Hansen (SDU)
Jason Jonkman (NREL)
Michael Muskulus (NTNU)
Vasilis Riziotis (NTUA)

MET. Measurement and
Experimental Techniques

Sandrine Aubrun (EC Nantes)
Martin Kühn (ForWind-OL)
Jakob Mann (DTU)
Gerard Schepers (ECN part of TNO)

Wednesday 20 June

Time			
09:45	Registration / Opening Ceremony		
10:30	Welcome Coffee		
11:10	AA 1	MET 1	DSE 1
13:00	Lunch		
14:00	AA 2	MET 2	DSE 2
15:30	Coffee Break		
16:00	Poster Session: AA	MET	DSE
17:15	Plenary Roundtable		
18:00	CHEESE AND WINE		

Thursday 21 June

Time				
09:00	Morning Coffee			
	WWT 1	MET 3	DSE 3	AA 3
10:30	Coffee Break			
11:10	WWT 2	MET 4	CM 1	AA 4
13:00	Lunch			
14:00	WWT 3	MST 1	CM 2	
15:30	Coffee Break			
16:00	Poster Session: WWT	MST	CM	
17:15	Plenary Lecture			
18:00				
20:00	GALA DINNER MUSEO DIOCESANO			

Friday 22 June

Time			
09:00	Morning Coffee		
	WWT 4	MST 2	CM 3
11:10	Coffee Break		
11:40	WWT 5	MST 3	CM 4
13:30	Lunch		
14:30	Closing Ceremony / Coffee To Go		

Rooms

- BL.28 Carassa e Dadda
- BL.27.01
- BL.27.02
- BL.27.03
- BL.27 Posters
- BL.27 Coffee and Lunch

Conference Information

Wi-Fi

A Wi-Fi connection is available in the Conference rooms as well as in the poster and coffee break areas.

To connect to wi-fi, turn on the wi-fi in your device(s), then select one of the two networks available:

- "Eduroam": select this network and use your username/password to connect to eduroam (education roaming), the secure world-wide roaming access service developed for the international research and education community.

- "Polimi": all the authors who have been registered to the PoliMI's web system during the paper submission, can use their person code and password to log in. Once selected this network, open a browser page and connect to the "Network access page", then select "WiFi login for Politecnico Users" and insert your person code and password.

Delegates who have not yet registered to the Politecnico di Milano, can start a new registration on-line. Ask at the registration desk or follow these steps:

- Connect to https://www.polimi.it/en/
- Tools
- Online services
- New users? Register
- Register a new user

At the end of the four-step registration procedure, you will be given a personal access code. The same code will be sent also by email to the address specified during the registration. You can use this person code and password to connect to "polimi" network.

Conference Website

The conference website with all the information is available at this link:
http://www.torque2018.org.

Conference Proceedings

The conference proceedings are published by IOP in the open-access Journal of Physics: Conference Series (JPCS). The proceedings can be accessed at this link: http://iopscience.iop.org/volume/1742-6596/1037

Best Poster Award

The program presents two plenary poster sessions on Wednesday and Thursday afternoon. All posters will be displayed in the poster area and available for conference delegates throughout all the Conference days.

As in the previous TORQUE editions, the best poster presentation will be awarded the 'TORQUE 2018 Best Poster' prize: all delegates are invited to vote for their own preferred posters. When thinking to the best posters, consider relevance, clarity and conciseness of the technical content along with the look and appeal of the poster itself.

The most voted poster will receive the TORQUE 2018 Best Poster Award during the Gala dinner on Thursday evening.

Further information is available on the Conference website: www.torque2018.org.

Transportation

Conference venue – Politecnico di Milano, Campus Bovisa Sud

By Suburban Railway System

The conference rooms are in the BL27 and BL28 buildings of the campus. This is easily accessible from two stations of the suburban railway system.

If you are arriving directly from Milan Malpensa Airport (MXP), please note that the Malpensa Express train to/from the airport stops at the station Milano Bovisa-Politecnico.

1) Bovisa-Politecnico (suburban lines **S1** **S2** **S3** **S4** **S12** **S13** and Malpensa Express to/from MXP)
There is only one exit from the station. With the exit behind you, turn right and walk a few steps until you reach a descending flight of stairs. From the base of the stairs you will see the campus in front of you. From there just follow the signs to the conference rooms.

2)   Villapizzone (suburban lines S5 S6 S11)
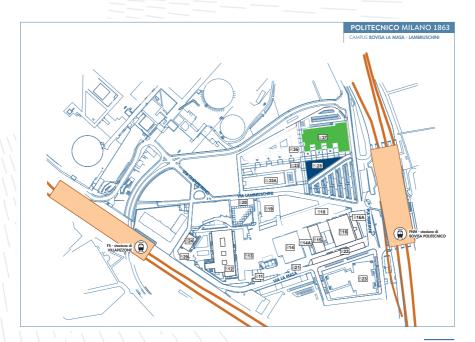
Leaving downstairs from the railway platform follow the signs Bovisa. When you are out of the railway station, follow the walkway. You will soon meet signs of the conference. After a straight walk of less than 5 minutes you will reach the conference rooms.

By Car/Taxi

The venue can be reached also by car/taxi. The exact address for the nav is: Via Lambruschini, 4 – 20156 Milano MI

Gala Dinner venue – Museo Diocesano

The venue of the gala dinner is the beautiful Museo Diocesano, which today occupies the ancient monastic complex of the Basilica di Sant'Eustorgio, in the central district of Milan.

The location can be reached with an easy and pleasant walk from the metro stop of Porta Genova, on the green metro line **M2**.
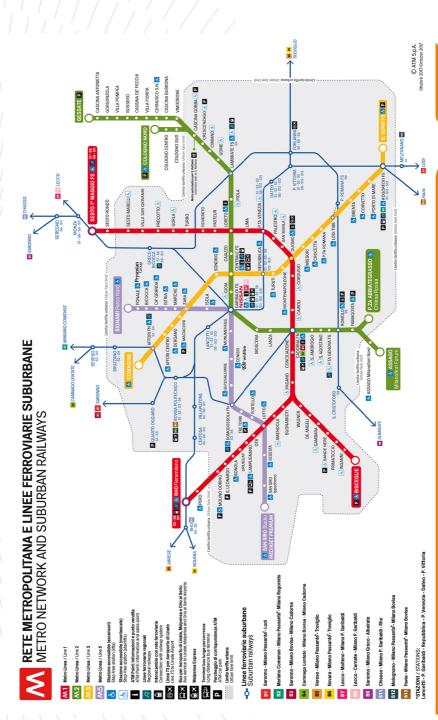

By Taxi

The gala dinner venue can be reached also by taxi. The exact address is: Piazza Sant'Eustorgio, 3 - 20123 Milano MI.

Further information is available on the Conference website: www.torque2018.org.

RETE METROPOLITANA E LINEE FERROVIARIE SUBURBANE
METRO NETWORK AND SUBURBAN RAILWAYS

Legend

- M1 Metro Linea / Line 1
- M2 Metro Linea / Line 2
- M3 Metro Linea / Line 3
- M5 Metro Linea / Line 5
- Stazione accessibile (ascensori) — Step-free station (lifts)
- Stazione accessibile (montascale) — Step-free station (stairlifts)
- Linee ferroviarie regionali — Regional railways
- ATM Point informazioni e punto vendita — ATM Point information and sales point
- Interscambio con rete ferroviaria — Connection with railway system
- Linea 73 per Aeroporto di Linate — Line 73 to Linate Airport
- Bus per Aeroporto di Linate, Malpensa e Orio al Serio — Bus service to Linate, Malpensa and Orio al Serio Airports
- Malpensa Express
- Terminal bus lunga percorrenza — Long distance bus terminal
- P Parcheggio di corrispondenza ATM — ATM car park
- Limite tariffa urbana — Urban fare limit

Linee ferroviarie suburbane
Suburban railways

- S1 Saronno - Milano Passante* - Lodi
- S2 Mariano Comense - Milano Passante* - Milano Rogoredo
- S3 Saronno - Milano Bovisa - Milano Cadorna
- S4 Camnago Lentate - Milano Bovisa - Milano Cadorna
- S5 Varese - Milano Passante* - Treviglio
- S6 Novara - Milano Passante* - Treviglio
- S7 Lecco - Molteno - Milano P. Garibaldi
- S8 Lecco - Carnate - Milano P. Garibaldi
- S9 Saronno - Milano Greco - Albairate
- S11 Chiasso - Milano P. Garibaldi - Rho
- S12 Melegnano - Milano Passante* - Milano Bovisa
- S13 Pavia - Milano Passante* - Milano Bovisa

*STAZIONI / STATIONS:
Lancetti - P. Garibaldi - Repubblica - P. Venezia - Dateo - P. Vittoria

Station labels (selection, as shown on map): GESSATE, Cascina Antonietta, Gorgonzola, Villa Pompea, Bussero, Cascina de' Pecchi, Villa Fiorita, Cernusco S.N., Cassina Burrona, Vimodrone, Cascina Gobba, Crescenzago, Cologno Nord, Cologno Centro, Cologno Sud, Cimiano, Udine, Lambrate FS, Sesto 1° Maggio FS, Sesto Marelli, Sesto Rondò, Villa San Giovanni, Precotto, Gorla, Turro, Rovereto, Pasteur, Loreto, Lima, P.ta Venezia, Palestro, San Babila, Duomo, Missori, Crocetta, P.ta Romana, Lodi TIBB, Brenta, Corvetto, Porto di Mare, Rogoredo FS, S. Donato, Melegnano, Lodi, Pavia, Monza, Sesto S. Giovanni, Sondrio, Caiazzo, Centrale FS, Repubblica, Garibaldi FS, Gioia, Isola, Zara, Marche, Istria, Ca' Granda, Bicocca, Greco, Bignami Parco Nord, Ponale, Dergano, Affori Centro, Affori FN, Comasina, Brizzano, Seveso, Camnago Lentate, Mariano Comense, Chiasso, Saronno, Seregno, Lecco, Maciachini, Lancetti, Monumentale, Lanza, Moscova, Cairoli, Cordusio, Cadorna FN, Conciliazione, Pagani, Buonarroti, Amendola, Lotto, Tre Torri, Portello, Domodossola FN, Gerusalemme, Villapizzone, Certosa, Quarto Oddiaro, Bonola, Uruguay, Lampugnano, QT8, Molino Dorino, S. Leonardo, Pero, RHO Fieramilano, RHO, Novara, Varese, San Siro Ippodromo, San Siro Stadio, Gambara, De Angeli, Wagner, Bande Nere, Primaticcio, Inganni, Bisceglie, Romolo, Famagosta, Assago Milanofiori Nord, Assago Milanofiori Forum, P.za Abbiategrasso, S. Agostino, S. Ambrogio, P.ta Genova FS, S. Cristoforo, Montenapoleone, Turati, Crescenzago, Forlanini FS, P. Vittoria, P. Romana FS, Dateo, Piola

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Ottobre 2017/October 2017

Instructions for Presenting Authors

Oral Presentations

- The time slot for each presentation is **15 minutes**, plus **5 minutes for Q&A**, please adjust the length of your speech and the number of slides to stay within the allowed time limit. Session chairs will strictly enforce the respect of the schedule.

- The official language is English. No translation will be provided during the sessions.

- A video projector and a PC will be available in all conference rooms. The use of personal laptops is not allowed.

- Presentations must be in PDF or PowerPoint format. Please use your preferred formatting style, as no presentation template will be provided. Slides must be written in the English language and must include the title and a complete list of authors with their respective affiliations.

- **Presentation must be loaded on the PC of the conference room well before the beginning of the session**. Please avoid loading your slides just before your talk, because this will shorten the time available for your presentation. Bring your presentations on a USB memory stick. Staff will be present in the rooms at all times during the conference to help you load and check your presentation.

- Please check when and where your presentation will take place. The detailed conference program is available at the link: http://www.torque2018.org/

- **Please make sure to be in your room well before your session starts and introduce yourself to the session chairperson before the beginning of the session**. Please hand-in to the chairperson a written bulleted bio (max 3-4 points). Please make sure that the chairperson knows how to pronounce your name.

Poster Presentations

- Please **check when and where your poster presentation will take place**. There are two plenary poster sessions:

  - Wednesday, June 20th, 16:00-17:15, sessions AA, DSE, MET;
  - Thursday, June 21st, 16:00-17:15, sessions CM, MST, WWT.

- The detailed conference program is available at the link:
  http://www.torque2018.org/
  Presenters must be available next to their posters during the entire duration of their poster session, to discuss their work with interested viewers.

- Posters must be printed in portrait ISO A0 size. Posters larger than this size or in landscape layout will exceed the available space on the standing boards, and they will be removed. The poster must be written in the English language and must include the title and a complete list of authors with their respective affiliations. Please use your preferred formatting style, as no poster template will be provided. We suggest that you choose font sizes that are easily readable from a distance, and a style that is visually appealing and clear.

- Please print the poster and bring it with you at the conference. No printing services is provided on site. Tape for mounting your poster will be provided at the conference.

- In the session Program, note the tag assigned to your poster. You will need this tag to find where to hang your poster. Maps will be available on-site to help you identify the location of your poster. Authors should hang their posters only in their assigned locations. You will be responsible for mounting your own poster. Please mount your poster as soon as you arrive at the conference, and do not take it down before you leave. Posters left up after the conference will be discarded.

Plenary Sessions

Opening Ceremony
Carassa e Dadda – Wednesday 20 June 09:45-10:30

Welcome and introduction to the conference by:

- The Dean of the School of Industrial and Information Engineering, Prof. Giovanni Lozza
- The Head of the Department of Aerospace Science and Technology, Prof. Giuseppe Sala
- TORQUE 2018 Chair, Prof. Alessandro Croce

Poster Session I
BL27 poster area – Wednesday 20 June 16:00-17:15

Poster presentations from the sections:

- AA | Aerodynamics and Aeroacoustics
- DSE | Design, System Engineering and New Concepts
- MET | Measurement and Experimental Techniques

Plenary Roundtable
Carassa e Dadda – Wednesday 20 June 17:15-18:00

"The effects of lifetime extension on the O&M costs and reliability of on-shore wind farms - The experiences of world-wide Italian companies".

Moderator: Prof. Dr. Carlo Luigi Bottasso | TUM

Panelist:
- Federico Fioretti | ENEL Green Power
- Nicola Riccardi | ERG Power Generation
- Carlo Durante | eTaBlades
- Michele Damiano | Cartflow

Poster Session II
BL27 poster area – Thursday 21 June 16:00-17:15

Poster presentations from the sections:

- CM | Control and Monitoring
- MST | Modeling and Simulation Technology
- WWT | Wind, Wakes and Turbulence

Plenary Lecture
Carassa e Dadda – Thursday 21 June 17:15-18:00

"Wind expected: brace yourself"
Emeritus Professor of Wind Energy Gijs van Kuik
Delft University of Technology

Closing Ceremony
Carassa e Dadda – Friday 22 June 14:30-15:15

Adjourn, presentation of the next EAWE events and closing speech by:

- TORQUE 2018 Chair, Prof. Alessandro Croce

Social Program

Welcome Cocktail
Campus Bovisa – Tuesday 19 June 18:00-19:30

Ice-breaking event at the end of the "Appetizers" program and before the Conference!

A networking opportunity for those who join the meetings and workshops the days before the Conference (http://www.torque2018.org/appetizers/), but also for all the delegates who will arrive in Milano the day before the Conference.

The Welcome Cocktail will be served in an open area in the Bovisa Campus close to the Wind Tunnel Building (B19, check the map). In case of bad weather conditions, the banquet will be held in Building BL27, lunch and coffee area.

Don't forget to collect your Conference Bag and the Badge at the registration desk close to the Welcome Cocktail area.

Cheese and Wine
BL27 lunch area – Wednesday 20 June 18:00-19:30

This Italian style banquet closes the first day of the Conference before a free night in Milano.

Another opportunity for networking in front of a good Italian glass of wine!

Gala Dinner
Museo Diocesano – Thursday 21 June 20:00-23:00

The Gala dinner is organized at Museo Diocesano (The Diocesan Museum), which is located in the setting of the cloisters of Sant'Eustorgio, integral part of one of the most antique monumental complexes of Milano, built from the joined units of the basilica and the Dominican convent.

During the dinner, the following award ceremonies will take place:

- EAWE Scientific Award
- EAWE Excellent Young Wind Doctor Award
- TORQUE 2018 Best Poster Award

For travel information to/from the Museo Diocesano please check the "Transportation" section.

Oral Sessions

Wednesday 20 June

AA. Aerodynamics and Aeroacoustics 1

Room: BL.28 Carassa e Dadda
Chaired by: **Philippe Chatelain | UCL**
Duration: 110 minutes

11:10 Introductory speech
Philippe Chatelain | UCL

11:15 Noise emission from wind turbines in wake - Measurement and modeling
Franck Bertagnolio | DTU

11:35 An integrated numerical method for wind turbine flow simulation, sound generation and propagation
Wei Jun Zhu | Yangzhou University

11:55 Aerodynamic effects of compressibility for wind turbines at high tip speeds
Niels Nørmark Sørensen | DTU

12:15 Blunt-Wavy Combined Trailing Edge for Wind Turbine Blade Inboard Performance Improvement
James Baeder | University of Maryland

12:35 Inflow Turbulence and Leading Edge Roughness Effects on Laminar-Turbulent Transition on NACA 63-418 Airfoil
Özge Sinem Özçakmak | DTU

12:55 Conclusive speech
Philippe Chatelain | UCL

13:00 Session end

MET. Measurement and Experimental 1

Room: BL.27.0.1
Chaired by: **Gerard Schepers | ECN part of TNO**
Duration: 110 minutes

11:10 Introductory speech
Gerard Schepers | ECN part of TNO

11:15 Wind turbine blade load characterization under yaw offset at the SWiFT facility
Brandon Ennis | Sandia National Laboratories

11:35 Generation of user defined turbulent inflow conditions by an active grid for validation experiments
Lars Kröger | ForWind - University of Oldenburg

11:55 Report of a towing test campaign of a scaled wind turbine
Sebastien Gueydon | MARIN (Maritime Research Institute Netherlands)

12:15 Experimental investigation of soft kite performance during turning maneuvers
Johannes Oehler | TU Delft

12:35 Evaluation of low cost vibration based damage detection systems
Filipe Magalhães | University of Porto

12:55 Conclusive speech
Gerard Schepers | ECN part of TNO

13:00 Session end

	11:10 - 13:00	

DSE. Design, System, Engineering and New Concepts 1

Room: BL.27.0.2
Chaired by: **Frederik Zahle | DTU**
Duration: 110 minutes

11:10 Introductory speech
Frederik Zahle | DTU

11:15 Impact of resin uptake of core materials on buckling of wind turbine blades
Alexandros Antoniou | Fraunhofer IWES

11:35 Structural design of a multi-megawatt wind turbine blade with ONE SHOT BLADE® Technology
Michele Damiano | Cartflow Srl

11:55 Preliminary design and optimization of a 20MW reference wind turbine
Luca Sartori | Politecnico di Milano

12:15 Multidisciplinary design analysis and optimisation of a reference offshore wind plant
Sebastian Sanchez Perez-Moreno | TU Delft

12:35 Integrated design optimization of wind turbines with noise emission constraints
Pietro Bortolotti | TUM

12:55 Conclusive speech
Frederik Zahle | DTU

13:00 Session end

AA. Aerodynamics and Aeroacoustics 2

Room: BL.28 Carassa e Dadda
Chaired by: **Flemming Rasmussen | DTU**
Duration: 90 minutes

14:00 Introductory speech
Flemming Rasmussen | DTU

14:05 Formulation of the General Momentum Equations
Edward Hart | University of Strathclyde

14:25 Comparison of actuator disc flows representing wind turbines and propellers
Gijs van Kuik | TU Delft

14:45 Predicting the Influence of Surface Protuberance on the Aerodynamic Characteristics of a NACA 633-418
Emil Krog Kruse | DTU

15:05 Improved airfoil polar predictions with data-driven boundary-layer closure relations
Gael de Oliveira | TU Delft

15:25 Conclusive speech
Flemming Rasmussen | DTU

15:30 Session end

MET. Measurement and Experimental Techniques 2

Room: BL.27.0.1
Chaired by: **Sandrine Aubrun | EC Nantes**
Duration: 90 minutes

14:00 Introductory speech
Sandrine Aubrun | EC Nantes

14:05 Coplanar lidar measurement of a single wind energy converter wake in distinct atmospheric stability regimes at the Perdigão 2017 experiment
Norman Wildmann | German Aerospace Center DLR

14:25 Offshore new European wind atlas
Ioanna Karagali | DTU

14:45 Evaluation of a LINCOM wind field reconstruction method with simulations and full-scale measurements
Marijn Floris van Dooren | ForWind - University of Oldenburg

15:05 Influence of atmospheric stability on the load spectra of wind turbines at alpha ventus
Matthias Kretschmer | University of Stuttgart

15:25 Conclusive speech
Sandrine Aubrun | EC Nantes

15:30 Session end

DSE. Design, System Engineering and New Concepts 2

Room: BL.27.0.2
Chaired by: **Katherine Dykes | NREL**
Duration: 90 minutes

14:00 Introductory speech
Katherine Dykes | NREL

14:05 Gravo-aeroelastic scaling of very large wind turbines to wind tunnel size
Helena Canet | TUM

14:25 Design of a two-bladed 10 MW rotor with teetering hub
Mauro Civati | Politecnico di Milano
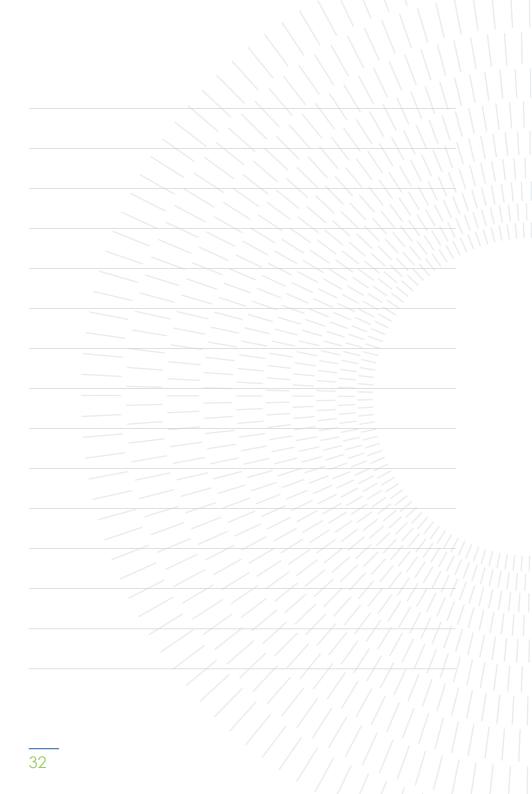
14:45 Assessment of flutter prediction and trends in the design of large-scale wind turbine rotor blades
D. Todd Griffith | UT Dallas

15:05 Optimal Aero-Elastic Design of a Rotor with Bend-Twist Coupling
Michael Mcwilliam | DTU

15:25 Conclusive speech
Katherine Dykes | NREL

15:30 Session end

Poster Session I

Wednesday 20 June

AA. Aerodynamics and Aeroacoustics – Posters

AA01 | Detached Eddy Simulation Model for the DU-91-W2-250 Airfoil
Krzysztof Rogowski | Warsaw University of Technology

AA02 | Aerodynamic performance analysis of a novel trailing edge flap for wind turbines
Bofeng Xu | Hohai University

AA03 | Analysis of winglets and sweep on wind turbine blades using a lifting line vortex particle method in complex inflow conditions
Matias Sessarego | DTU

AA04 | Comparison of unsteady aerodynamics on wind turbine blades using methods of ranging fidelity
Tim Lehmann | EUROS

AA05 | Actuator-Line Model in a Lattice Boltzmann Framework for Wind Turbine Simulations
Sonia Rullaud | IFP Energies nouvelles

AA06 | Consistent 3D CFD and BEM simulations of a research turbine considering rotational augmentation
Giorgia Guma | University of Stuttgart

AA07 | Active separation control on a very thick wind turbine airfoil - A URANS and DDES perspective
Galih Bangga | University of Stuttgart

AA08 | Numerical Fluid-Structure Interaction Study on the NREL 5MW HAWT
Amr M. Halawa | Kyushu University

AA09 | Rotor aerodynamics in sheared inflow: An analysis of out-of-plane bending moments
Daniel Micallef | University of Malta

AA10 | Evaluation of different methods of determining the angle of attack on wind turbine blades under yawed inflow conditions
Kisorthman Vimalakanthan | ECN

AA. Aerodynamics and Aeroacoustics – Posters

AA11 | Non-conventional vortex generators calculated with CFD
Sugoi Gomez Iradi | CENER

AA12 | On the effect of blade deformations on the aerodynamic performance of wind turbine rotors subjected to yawed inflow
Bastian Dose | ForWind - University of Oldenburg

AA13 | CFD Simulations of the New MEXICO Rotor Experiment under Yawed Flow
Manfred Imiela | German Aerospace Center DLR

AA14 | Mitigating loads by means of an active slat
Lars Neuhaus | University of Oldenburg

AA15 | State space realisation and model reduction of potential-flow aerodynamics for HAWT applications
Salvatore Maraniello | Imperial College London

AA16 | Experimental investigation on the effect of the duct geometrical parameters on the performance of a ducted wind turbine
Juan Tang | TU Delft

AA17 | Flow Physics behind the Effect of Leading-edge Protuberances on the Airfoil Aerodynamic Performance
Ming Zhao | Tianjin University, Chinese Academy of Sciences

AA18 | The influence of wing twist on pressure distribution and flow topology
Janik Kiefer | DTU

AA19 | Nonlinear wave effects on dynamic responses of a semisubmersible floating offshore wind turbine in the intermediate water
Jia Pan | The University of Tokyo

AA20 | Comparison of some wind turbine noise emission models coupled to BEM aerodynamics
Carlo Rosario Sucameli | TUM

Wednesday

AA. Aerodynamics and Aeroacoustics – Posters

AA21 | Experimental and numerical validation of active flaps for wind turbine blades
Alejandro Gomez Gonzalez | Siemens Gamesa Renewable Energy A/S

AA22 | Results of the Research Project AssiSt
Matthias Arnold | Enercon

AA23 | Performance and midspan wake measurements on a H-Darrieus in controlled conditions
Giacomo Persico | Politecnico di Milano

AA24 | Probabilistic Design of Airfoils for Horizontal Axis Wind Turbines
Ricardo Pereira | TU Delft

AA25 | Experimental Determination of Thrust Loading of a 2-Bladed Vertical Axis Wind Turbine
Bruce LeBlanc | TU Delft

AA26 | Wind tunnel tests of an airfoil with 18% relative thickness equipped with vortex generators
Christian Bak | DTU

17:15 Session end

DSE. Design, System Engineering and New Concepts – Posters

DSE01 | Design exploration prior to blade multi-disciplinary optimisation
Fernando Echeverria | Nordex

DSE02 | Load Reduction in Wind Turbines with Bend-Twist Coupled Blades without Power Loss at Underrated Wind Speeds
Oğuz Atalay | METU

DSE03 | Load distribution in a roller-type rotor blade bearing
Matthias Stammler | Fraunhofer IWES

DSE04 | Design and Analysis of Shrouded Small-Scale Wind Turbine for Low Wind Speeds
Rahmi Erdem Yildiz | Momentum R&D Ltd.

DSE05 | Aero-structural optimization of wind turbine blades using a reduced set of design load cases including turbulence
Matias Sessarego | DTU

DSE06 | Cost Evaluation of Two Concepts for the Integration of Hydropneumatic Energy Storage in Floating Wind Turbines
Tonio Sant | University of Malta

DSE07 | Main bearings in large offshore wind turbines: development trends, design and analysis requirements
Jone Torsvik | NTNU

DSE08 | Risk-based approach for rational categorization of damage observations from wind turbine blade inspections
Nikolay Dimitrov | DTU

DSE09 | Numerical prediction of Normal and Extreme Waves at Fukushima Offshore Site
Atsushi Yamaguchi | The University of Tokyo

DSE10 | Assessment of an Alternative Concept for a High-Altitude Wind-Power Generator
Max Langbein | RHRK Kaiserslautern

Wednesday

DSE. Design, System Engineering and New Concepts – Posters

DSE11 | Passive structural control techniques for a 3 MW wind turbine prototype
Andreas Schulze | University of Rostock

DSE12 | Damage Progression in Thick Curved Composite Laminates under Static and Fatigue Loading
Burcu Tasdenir | METU

DSE13 | Design of an independent smart service platform for wind turbines
Stefan Kock | RWTH Aachen

DSE14 | Strength Analysis of a Composite Wind Turbine Blade Using Puck Failure Criteria
Can Muyan | METU

17:15 Session end

MET. Measurement and Experimental Techniques – Posters

MET01 | Experimental study of wind load acting on wind turbine nacelles
Jay Prakash Goit | The University of Tokyo

MET02 | Investigation into Boundary Layer Transition on the MEXICO Blade
Brandon Arthur Lobo | University of Applied Sciences, Flensburg

MET03 | Uncertainty quantification in analyses of operational wind power plant performance
Anna Craig | National Renewable Energy Laboratory (NREL)

MET04 | Wind turbine wake characterization in complex terrain via integrated Doppler lidar datasets from the Perdigão experiment
Rebecca Barthelmie | Cornell University

MET05 | In-blade Load Sensing on 3D Printed Wind Turbine Blades Using Trailing Edge Flaps
David Johnson | University of Waterloo

MET06 | Experimental investigation of the unsteady aerodynamics of FOWT through PIV and hot-wire wake measurements
Luca Bernini | Politecnico di Milano

MET07 | A wind tunnel/HIL setup for integrated tests of Floating Offshore Wind Turbines
Alessandro Fontanella | Politecnico di Milano

MET08 | On the parameter sensitivity in structural parameter identification using Eigensyetem Realization Algorithm for a MW-size wind turbine
Sho Oh | ClassNK

MET09 | Inflow characterization using measurements from the SpinnerLidar: the ScanFlow experiment
Torben Krogh Mikkelsen | DTU

MET10 | Power curve measurement uncertainty – follow up comparative exercise for IEA Task 32
David Schlipf | DNV GL

MET. Measurement and Experimental Techniques – Posters

MET11 | New European Wind Atlas: The Oesterild balconies experiment
Ioanna Karagali | DTU

MET12 | Development of a torque calibration procedure under rotation for nacelle test benches
Paula Weidinger | Physikalisch-Technische Bundesanstalt Braunschweig

MET13 | Investigation of dynamic drivetrain behaviour of a wind turbine during a power converter fault
Tobias Duda | RWTH Aachen

MET14 | Sub-soil strain measurements on an operational wind turbine for design validation and fatigue assessment
Maximilian Henkel | Vrije Universiteit Brussel

MET15 | Development of a dynamically scaled wind turbine
Andreas Schulze | University of Rostock

MET16 | Comparison of different measurement methods for a nacelle-based lidar power curve
Florian Haizmann | University of Stuttgart

MET17 | Long term operational modal analysis for rotating machines
Nicoletta Gioia | Vrije Universiteit Brussel

MET18 | Validating a simulation environment for floating lidar systems
Oliver Bischoff | University of Stuttgart

MET19 | Evaluating airfoil behaviour such as laminar separation bubbles with visualization and IR thermography methods
David Johnson | University of Waterloo

MET20 | Correlation between Lidar measured wind speeds and aerodynamic loading
Ashim Giyanani | TU Delft

17:15 Session end

Oral Sessions

Thursday 21 June

AA. Aerodynamics and Aeroacoustics 3

Room: BL.27.03
Chaired by: **Carlos Simao Ferreira | TU Delft**
Duration: 90 minutes

09:00 Introductory speech
Carlos Simao Ferreira | TU Delft

09:05 Comparison of Aero-Elastic Simulations with Measurements performed on NENUPHAR's 600kW Vertical Axis Wind Turbine: Impact of the Aerodynamic Modelling Methods
Frédéric Blondel | IFP Energies nouvelles

09:25 Measured aerodynamic forces on a full scale 2MW turbine in comparison with EllipSys3D and HAWC2 simulations
Helge Aagaard Madsen | DTU

09:45 Comparison of 3D transitional CFD simulations for Rotating Wind Turbine Wings with Measurements
Alois Peter Schaffarczyk | Kiel University of Applied Sciences

10:05 Final results from the EU project AVATAR: How to model large wind turbines aerodynamically?
Gerard Schepers | ECN

10:25 Conclusive speech
Carlos Simao Ferreira | TU Delft

10:30 Session end

MET. Measurement and Experimental Techniques 3

Room: BL.27.0.1
Chaired by: **Jakob Mann | DTU**
Duration: 90 minutes

09:00 Introductory speech
Jakob Mann | DTU

09:05 Very short-term probabilistic forecasting of wind power based on dual-Doppler radar measurements in the North Sea
Laura Valldecabres Sanmartin | ForWind - University of Oldenburg

09:25 Calculation of the Power Output Loss based on Thermographic Measurement of the Leading Edge Condition
Nicholas Gaudern | Anakata Wind Power Resources Ltd

09:45 Robustness test fo wind turbine gearbox bearings
Stephan Neuman | RWTH Achen

10:05 An effective method of determining the drive-train efficiency of wind turbines with high accuracy
Hongkun Zhang | Fraunhofer IWES

10:25 Conclusive speech
Jakob Mann | DTU

10:30 Session end

Thursday

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DSE. Design, System Engineering and New Concepts 3

Room: BL.27.0.2
Chaired by: **Joshua A. Paquette | SANDIA**
Duration: 90 minutes

09:00 Introductory speech
Joshua A. Paquette | SANDIA

09:05 Airfoil Blender for Blade Optimizations
Witold Skrzypinski | DTU

09:25 Aerodynamic Design Optimization of Wind Turbine Airfoils under Aleatory and Epistemic Uncertainty
Marco Caboni | ECN

09:45 A method for reducing multi-modality in the wind farm layout optimization problem
Jared J. Thomas | Brigham Young University

10:05 Computational fluid dynamics-based surrogate optimization of a wind turbine blade tip extension for maximising energy production
Frederik Zahle | DTU

10:25 Conclusive speech
Joshua A. Paquette | SANDIA

10:30 Session end

WWT. Wind, Wakes and Turbulence 1

Room: BL.28 Carassa e Dadda
Chaired by: **Stefan Ivanell | Uppsala**
Duration: 90 minutes

09:00 Introductory speech
Stefan Ivanell | Uppsala

09:05 The turbulence scales of a wind turbine wake: A revisit of extended k-epsilon models
Paul van der Laan | DTU

09:25 Data-driven Wake Modelling for Reduced Uncertainties in short-term Possible Power Estimation
Tuhfe Göçmen | DTU

09:45 Influence of the horizontal component of Earth's rotation on wind turbine wakes
Michael F. Howland | Stanford University

10:05 Data-Driven Machine Learning for Wind Plant Flow Modeling
Ryan King | National Renewable Energy Laboratory (NREL)

10:25 Conclusive speech
Stefan Ivanell | Uppsala

10:30 Session end

WWT. Wind, Wakes and Turbulence 2

Room: BL.28 Carassa e Dadda
Chaired by: **Spyros Voutsinas | NTUA**
Duration: 110 minutes

11:10 Introductory speech
Spyros Voutsinas | NTUA

11:15 Influence of ground roughness on the wake of a yawed wind turbine - a comparison of wind-tunnel measurements and model predictions
Victor Pablo Stein | TUM

11:35 Annual impact of wind-farm gravity waves on the Belgian–Dutch offshore wind-farm cluster
Johan Meyers | KU Leuven

11:55 High speed PIV measurements of an adaptive camber airfoil under highly gusty inflow conditions
Tom T. B. Wester | ForWind - University of Oldenburg

12:15 Wake behind an offshore wind farm observed with dual-Doppler radars
Nicolai Gayle Nygaard | Ørsted Wind Power

12:35 Detailed analysis of a waked turbine using a high-resolution scanning lidar
Thomas Herges | Sandia National Laboratories

12:55 Conclusive speech
Spyros Voutsinas | NTUA

13:00 Session end

Thursday

MET. Measurement and Experimental Techniques 4

Room: BL.27.0.1
Chaired by: **Martin Kühn | ForWind – University Oldenburg**
Duration: 110 minutes

11:10 Introductory speech
Martin Kühn | ForWind - University Oldenburg

11:15 Wind turbine aerodynamic measurements using a scanning lidar
Christopher L. Kelley | Sandia National Laboratories

11:35 Rotor solidity effects on the performance of vertical-axis wind turbines at high Reynolds numbers
Mark A. Miller | Princeton University

11:55 Design of a multipurpose scaled wind turbine model
Emmanouil Marios Nanos | TUM

12:15 Experimental investigation of dynamic inflow effects with a scaled wind turbine in a controlled wind tunnel environment
Frederik Berger | ForWind - University of Oldenburg

12:35 Experimental investigation of Surface Roughness effects and Transition on Wind Turbine performance
Oscar Pires | CENER

12:55 Conclusive speech
Martin Kühn | ForWind - University Oldenburg

13:00 Session end

CM. Control and Monitoring 1

Room: BL.27.02
Chaired by: **Po Wen Cheng | USTUTT**
Duration: 110 minutes

11:10 Introductory speech
Po Wen Cheng | USTUTT

11:15 A SCADA data mining method for precision assessment of performance enhancement from aerodynamic optimization of wind turbine blades
Davide Astolfi | University of Perugia

11:35 Vibration control of floating offshore wind turbines using liquid column dampers
Zili Zhang | Aarhus University

11:55 Adaptive Sigma-Point Kalman Filtering for Wind Turbine State and Process Noise Estimation
Bastian Ritter | TU Darmstadt

12:15 Performance evaluation of a blade-mounted LiDAR with dynamic versus fixed parameters through the feedback-feedforward individual pitch and trailing edge flaps control
Róbert Ungurán | ForWind - University of Oldenburg

12:35 Assessing the Utility of Early Warning Systems for Detecting Failures in Main Wind Turbine Components
Lorenzo Colone | DTU

12:55 Conclusive speech
Po Wen Cheng | USTUTT

13:00 Session end

AA. Aerodynamics and Aeroacoustics 4

Room: BL.27.03
Chaired by: **Carlos Simao Ferreira | TU Delft**
Duration: 110 minutes

11:10 Introductory speech
Carlos Simao Ferreira | TU Delft

11:15 Experimental lift control using fluidic jets on a model wind turbine
Sophie Baleriola | University of Orléans

11:35 Towards the understanding of vertical-axis wind turbines in double-rotor configuration
Delphine De Tavernier | TU Delft

11:55 Towards improving the aerodynamic performance of a ducted wind turbine: A numerical study
Vinit Dighe | TU Delft

12:15 Critical evolution of leading edge suction during dynamic stall
Julien Deparday | EPFL

12:35 Aerodynamic and load control performance testing of a morphing trailing edge flap system on an outdoor rotating test rig
Thanasis K. Barlas | DTU

12:55 Conclusive speech
Carlos Simao Ferreira | TU Delft

13:00 Session end

Thursday

WWT. Wind, Wakes and Turbulence 3

Room: BL.28 Carassa e Dadda
Chaired by: **Jens Nørkær Sørensen | DTU**
Duration: 90 minutes

14:00 Introductory speech
Jens Nørkær Sørensen | DTU

14:05 Downstream effects from contemporary wind turbine deployments
Sara C. Pryor | Cornell University

14:25 Instanteneous Response and Mutual Interaction between Wind Turbine and Flow
Søren Juhl Andersen | DTU

14:45 Quantification of the axial induction exerted by utility-scale wind turbines by coupling LiDAR measurements and RANS simulations
Giacomo Valerio Iungo | UT Dallas

15:05 Improved modelling of fatigue loads in wind farms under non-neutral ABL stability conditions
Gunner C. Larsen | DTU

15:25 Conclusive speech
Jens Nørkær Sørensen | DTU

15:30 Session end

CM. Control and Monitoring 2

Room: BL.27.02
Chaired by: **Ervin Bossanyi | DNV GL**
Duration: 90 minutes

14:00 Introductory speech
Ervin Bossanyi | DNV GL

14:05 Investigation on the potential of individual blade control for lifetime extension
Vasilis Pettas | University of Stuttgart

14:25 Simultaneous observation of wind shears and misalignments from rotor loads: formulation for IPC controlled wind turbines
Marta Bertelè | TUM

14:45 Validating subspace predictive repetitive control under turbulent wind conditions with wind tunnel experiment
Joeri Frederik | TU Delft

15:05 Delft Research Controller: an open-source and community-driven wind turbine baseline controller
Sebastiaan Mulders | TU Delft

15:25 Conclusive speech
Ervin Bossanyi | DNV GL

15:30 Session end

Thursday

MST. Modeling and Simulation Technology 1

Room: BL.27.0.1
Chaired by: **Morten Hartvig Hansen | University of Southern Denmark**
Duration: 90 minutes

14:00 Introductory speech
Morten Hartvig Hansen | University of Southern Denmark

14:05 Friction as a major uncertainty factor on torque measurement in wind turbine test benches
Stefan Kock | RWTH Achen

14:25 High-resolution periodic mode shapes identification for wind turbines
Riccardo Riva | DTU

14:45 A Bayesian Approach for Predicting Wind Turbine Failures based on Meteorological Conditions
Maik Reder | CIRCE

15:05 Actuator Line Method Simulations for the Analysis of Wind Turbine Wakes Acting on Helicopters
Manuel Buehler | University of Stuttgart

15:25 Conclusive speech
Morten Hartvig Hansen | University of Southern Denmark

15:30 Session end

Poster Session II

Thursday 21 June

CM. Control and Monitoring – Posters

CM01 | Development and validation of real time load estimator on Goldwind 6.x MW wind turbine
Martin Evans | DNV GL

CM02 | Detection of rotational periodic torque deviations in variable-speed wind turbine systems using disturbance observer and phase-locked loop
Korbinian Schechner | TUM

CM03 | A constrained model predictive wind farm controller providing active power control: an LES study
Sjoerd Boersma | TU Delft

CM04 | Wind turbine Cpmax and drivetrain-losses estimation using Gaussian process machine learning
Edward Hart | University of Strathclyde

CM05 | Lidar-assisted Extreme Load Reduction by Multi-variable Protective Derating
Florian Haizmann | University of Stuttgart

CM06 | Load reduction based on a stochastic disturbance observer for a 5 MW IPC wind turbine
Arndt Hoffmann | German Aerospace Center DLR

CM07 | Observer design and optimization for model-based condition monitoring of the wind turbine rotor blades using genetic algorithm
Fanzhong Meng | Fraunhofer IWES

CM08 | Fault Detection and Classification of Permanent Magnet Synchronous Motors in Variable Load and Speed Conditions using Order Tracking and Machine Learning
Jagath Sri Lal Senanayaka | University of Agder

CM09 | A Robust Method for Detection and Classification of Permanent Magnet Synchronous Motor Faults: Deep Autoencoders and Data Fusion Approach
Jagath Sri Lal Senanayaka | University of Agder

Thursday

CM. Control and Monitoring – Posters

CM10 | Repetitive Pitch Control for Vertical Axis Wind Turbine
Vimanyu Kumar | TU Delft

CM11 | Reduction of unwanted swings and motions in floating wind turbines
Luis Felipe Recalde Camacho | University of Strathclyde

CM12 | Modelling the aerodynamic coefficients of wind turbines by using neural networks for control design purposes
Adrian Gambier | Fraunhofer IWES

CM13 | A novel method of drive train damping for large wind turbine
Yong Jiang | Shanghai Electric Windpower Group Ltd.

CM14 | A multi-objective predictive control strategy for enhancing primary frequency support with wind farms
Sara Siniscalchi Minna | Catalonia Institute for Energy Research (IREC)

CM15 | Reliability analysis of fatigue damage extrapolations of wind turbines using offshore strain measurements
Clemens Hübler | Leibniz Universität Hannover

CM16 | Fault diagnostics of wind turbine electric pitch systems using sensor fusion approach
Andreas Klausen | University of Agder

CM17 | Real-time three dimensional wind field reconstruction from nacelle LiDAR measurements
Domenico Di Domenico | IFP Energies nouvelles

CM18 | Statistical Evaluation of SCADA data for Wind Turbine Condition Monitoring and Farm Assessment
Elena Gonzalez | CIRCE

CM19 | Derating a single wind farm turbine for reducing its wake and fatigue
Irene Eguinoa | CENER

Thursday

CM. Control and Monitoring – Posters

CM20 | On wind turbine down-regulation control strategies and rotor speed set-point
Wai Hou Lio | DTU

CM21 | Monitoring rotor aerodynamic and mass imbalances through a self-balancing control
Carlo E.D. Ribordi | Politecnico di Milano

CM22 | Assessment of load reduction capabilities using passive and active control methods on a 10MW-scale wind turbine
Vasilis Riziotis | NTUA

CM23 | Robust Power-Electronic-Converter Fault Detection and Isolation Technique for DFIG Wind Turbines
Marcelo Nesci Soares | Université Libre de Bruxelles

CM24 | Stochastic simulation assessment of an automated vibration-based condition monitoring framework for wind turbine gearbox faults
Cédric Peeters | Vrije Universiteit Brussel

CM25 | Inflow-based flap control on a 10MW-scale wind turbine using a spinner anemometer
Vasilis Riziotis | NTUA

CM26 | Comparison between NMPC and EOR control of wind turbines using LIDAR wind measurements
Amin Mahdizadeh | University of Melbourne

17:15 Session end

MST. Modeling and Simulation Technology – Posters

MST01 | The influence of different mooring line models on the stochastic dynamic responses of floating wind turbines
Christian Elkjær Høeg | Aarhus University

MST02 | Efficient ultimate load estimation for offshore wind turbines using interpolating surrogates models
Laurent van den Bos | CWI Amsterdam

MST03 | A constraint-free flight simulator package for airborne wind energy systems
Gonzalo Sanchez-Arriaga | Universidad Carlos III de Madrid

MST04 | Alternative linearisation methodology for aero-elastic Floating Offshore Wind Turbine non-linear models
Joannes Olondriz | IK4-Ikerlan

MST05 | Control Oriented Modelling of a Wind Turbine and Farm
Sung-Ho Hur | Kyungpook National University

MST06 | Bayesian approach with subjective opinion fusions for wind turbine maintenance
Bahri Uzunoglu | Uppsala University

MST07 | Aerodynamic modelling of wind turbine blade loads during extreme deflection events
Matthew Harrison | DNV GL

MST08 | Load validation of aero-elastic simulations with measurements performed on a 850kW horizontal-axis wind turbine
Uwe Schmidt Paulsen | DTU

MST09 | Study of the influence of oscillating trailing edge flaps on the AVATAR rotor using CFD simulations
Jonh Prospathopoulos | NTUA

MST10 | Validation of the gearbox load calculation of a wind turbine MBS model
Daniel Matzke | RWTH Aachen

Thursday

MST. Modeling and Simulation Technology – Posters

MST11 | Calibrating a wind turbine model using diverse datasets
Jennifer Marie Rinker | DTU

MST12 | Wind turbine site-specific load estimation using artificial neural networks calibrated by means of high-fidelity load simulations
Laura Schröder | DTU

MST13 | Experimental and Model-based Analysis of the Force Transmission in a Rotor Bearing Support System
Sebastian Reisch | RWTH Aachen

MST14 | Advanced Medium-Order Modelling of a Wind Turbine Wake with a Vortex Particle Method Integrated within a Multilevel Code
Joseph Robert Saverin | TU Berlin

MST15 | Investigation of droplet path in a rain erosion tester
Nicolai Frost-Jensen Johansen | DTU

MST16 | A Simulation Study on the Annual Power Increase with Active Induction Wind Farm Control including Wind Direction Change
Hyungyu Kim | Kangwon National University

MST17 | PyConTurb: an open-source constrained turbulence generator
Jennifer Marie Rinker | DTU

17:15 Session end

WWT. Wind, Wakes and Turbulence – Posters

WWT02 | Optimal distribution width for ALM in LES for (NEW) MEXICO experiment
Christian Masson | ÉTS Montréal

WWT03 | Validation of turbulence models through SCADA data
Inga Reinwardt | HAW Hamburg

WWT04 | Validation of wind turbine wake models with focus on the dynamic wake meandering model
Inga Reinwardt | HAW Hamburg

WWT05 | A hybrid BEM-CFD model for effective numerical siting analyses of wind turbines in the urban environment
Simone Bigalli | Università degli Studi di Firenze

WWT06 | Comparing Meso-Micro Methodologies for Annual Wind Resource Assessment and Turbine Siting at Cabauw
Javier Sanz Rodrigo | CENER

WWT07 | The induction zone/factor and sheared inflow: A linear connection?
Alexander Meyer Forsting | DTU

WWT08 | Large-eddy simulation of scaled floating wind turbines in a boundary layer wind tunnel
Jiangang Wang | TUM

WWT09 | The effect of blade-tower interaction on the structure loading of multi megawatt horizontal axis wind turbine
Yasir Shkara | RWTH Aachen

WWT10 | Development of a stochastic computational fluid dynamics approach for offshore wind farms
Mark Richmond | Cranfield University

Thursday

Thursday

WWT. Wind, Wakes and Turbulence – Posters

WWT11 | Experimental analysis of the wake dynamics of a modelled wind turbine during yaw manoeuvres
Stefano Macrì | University of Orléans

WWT12 | Preliminary estimate of the impact of support structures on the aerodynamic performance of very large wind farms
Lun Ma | Cranfield University

WWT13 | UNAFLOW project: UNsteady Aerodynamics of FLOating Wind turbines
Alberto Zasso | Politecnico di Milano

WWT14 | Determining variabilities of non-Gaussian wind-speed distributions using different metrics and timescales
Monte Lunacek | University of Colorado Boulder

WWT15 | Comparison of wind turbine loads inside a wake between engineering model and CFD calculation
Björn Roscher | RWTH Aachen

WWT16 | Fatigue load estimations of intermittent wind dynamics based on a Blade Element Momentum method
Carl Michael Schwarz | ForWind - University of Oldenburg

WWT17 | Exploring a better turbine layout in vertically staggered wind farms
Richard J.A.M. Stevens | University of Twente

WWT18 | An experimental analysis of wind and power fluctuations through time-resolved data of full scale wind turbines
Francesco Castellani | University of Perugia

WWT19 | Detached Eddy Simulations of the local atmospheric flow field within a forested wind energy test site located in complex terrain
Patrick Letzgus | University of Stuttgart

WWT20 | Numerical Investigations of Wind Turbine Wakes under Neutral and Convective Atmospheric Stability Conditions
Linlin Tian | Nanjing University of Aeronautics and Astronautics

WWT. Wind, Wakes and Turbulence – Posters

WWT21 | Development and interactions of rotor wakes
Jens Nørkær Sørensen | DTU

WWT22 | Investigation of the complete power conversion chain for small vertical- and horizontal-axis wind turbines in turbulent winds
Philippe Chatelain | KU Leuven

WWT23 | Statistical analysis of a field database to study stability effects on wind turbine wake properties
Sandrine Aubrun | University of Orléans

WWT24 | Numerical analysis of unsteady aerodynamics of floating offshore wind turbines
Marion Cormier | University of Stuttgart

WWT25 | Wind tunnel experiments of a pair of interacting vertical-axis wind turbines
Antoine Vergaerde | Vrije Universiteit Brussel

WWT26 | Atmospheric Gravity Wave Impacts on an Offshore Wind Farm
Simon Watson | Loughborough University

WWT27 | A Large Eddy Simulation framework to assess wind farm power maximization strategies: Validation of maximization by yawing
Bruno López | Universidad de la República - Uruguay

WWT28 | Combined experimental and numerical study on the near wake of a Darrieus VAWT under turbulent flows
Andreu Carbo Molina | Università degli Studi di Firenze

WWT29 | Comparison of Mean and Dynamic Wake Characteristics between Research-Scale and Full-Scale Wind Turbines
Paula Doubrawa | National Renewable Energy Laboratory (NREL)

WWT30 | Enrichment methods for inflow turbulence generation in the atmospheric boundary layer
Patrick Moriarty | National Renewable Energy Laboratory (NREL)

Thursday

WWT. Wind, Wakes and Turbulence – Posters

WWT31 | Towards an adjoint based 4D-Var state estimation for turbulent flow
Pieter Bauweraerts | KU Leuven

WWT32 | Large eddy simulation with realistic geophysical inflow of Alpha Ventus wind farm: a comparison with LIDAR field experiments
Yulia T. Peet | Arizona State University

17:15 Session end

Oral Sessions

Friday 22 June

WWT. Wind, Wakes and Turbulence 4

Room: BL.28 Carassa e Dadda
Chaired by: **Jens Nørkær Sørensen | DTU**
Duration: 130 minutes

09:00 Introductory speech
Jens Nørkær Sørensen | DTU

09:05 Wind-turbine wakes responding to stably stratified flow over complex terrain
Andreas Dörnbrack | German Aerospace Center DLR

09:25 Flow in complex terrain - a Large Eddy Simulation comparison study
Jacob Berg | DTU

09:45 Numerical simulation of the impact of atmospheric turbulence on a wind turbine in complex terrain
Patrick Letzgus | University of Stuttgart

10:05 Challenges in using scanning lidars to estimate wind resources in complex terrain
Jakob Mann | DTU

10:25 An annual energy production estimation methodology for onshore wind farms over complex terrain using a RANS model with actuator discs
Matias Avila | Barcelona SuperComputing Center

10:45 A one-parameter model for turbine wakes from the entrainment hypothesis
Paolo Luzzatto-Fegiz | UC Santa Barbara

11:05 Conclusive speech
Jens Nørkær Sørensen | DTU

11:10 Session end

Friday

MST. Modeling and Simulation Technology 2

Room: BL.27.0.1
Chaired by: **Vasilis Riziotis | NTUA**
Duration: 130 minutes

09:00 Introductory speech
Vasilis Riziotis | NTUA

09:05 Validation of FAST.Farm Against Large-Eddy Simulations
Jason Jonkman | National Renewable Energy Laboratory (NREL)

09:25 Large Eddy Simulation of a wind tunnel wind farm experiment with one hundred static turbine models
Juliaan Bossuyt | KU Leuven

09:45 Validation of large-eddy simulation of scaled waked wind turbines in different yaw misalignment conditions
Chengyu Wang | TUM

10:05 Aerodynamic analysis of Ampyx's airborne wind energy system
Kisorthman Vimalakanthan | ECN

10:25 Understanding Biases in Pre-Construction Estimates
Monte Lunacek | National Renewable Energy Laboratory (NREL)

10:45 Coupling of mesoscale weather research and forecasting model to a high fidelity Large Eddy Simulation
Umberto Ciri | UT Dallas

11:05 Conclusive speech
Vasilis Riziotis | NTUA

11:10 Session end

Friday

CM. Control and Monitoring 3

Room: BL.27.02
Chaired by: **Jan-Willem van Wingerden | TU Delft**
Duration: 130 minutes

09:00 Introductory speech
Jan-Willem van Wingerden | TU Delft

09:05 Investigation into the shape of a wake of a yawed full-scale turbine
Paul Fleming | National Renewable Energy Laboratory (NREL)

09:25 Combining induction control and wake steering for wind farm energy and fatigue loads optimisation
Ervin Bossanyi | DNV GL

09:45 Study of wind farm control potential based on SCADA data
Johannes Schreiber | TUM

10:05 Joint state-parameter estimation for a control-oriented LES wind farm model
Bart Matthijs Doekemeijer | TU Delft

10:25 A POD reduced-order model for wake steering control
Alberto Fortes-Plaza | TUM

10:45 Optimal dynamic induction and yaw control of wind farms: effects of turbine spacing and layout
Wim Munters | KU Leuven

11:05 Conclusive speech
Jan-Willem van Wingerden | TU Delft

11:10 Session end

WWT. Wind, Wakes and Turbulence 5

Room: BL.28 Carassa e Dadda
Chaired by: **Vasilis Riziotis | NTUA**
Duration: 110 minutes

11:40 Introductory speech
Vasilis Riziotis | NTUA

11:45 E-Wind: Steady state CFD approach for stratified flows used for site assessment at Enercon
Michael Alletto | WRD MS

12:05 Large-eddy simulation study of multi-rotor wind turbines
Niranjan S Ghaisas | Stanford University

12:25 A comparative analysis of built environment and open terrain wind data by higher order statistics and performance evaluation of 5 kW HAWT using FAST
Anup Kc | Murdoch University

12:45 Analysis and validation of Weather Research and Forecasting model tendencies for meso-to-microscale modelling of the atmospheric boundary layer
Roberto Aurelio Chavez-Arroyo | CENER

13:05 Development of wake meandering detection algorithms and their application to Large Eddy Simulations of an isolated wind turbine and a wind farm
Nicolas Coudou | VKI, UMONS & UCL

13:25 Conclusive speech
Vasilis Riziotis | NTUA

13:30 Session end

Friday

MST. Modeling and Simulation Technology 3

Room: BL.27.0.1
Chaired by: **Jason Jonkman | NREL**
Duration: 110 minutes

11:40 Introductory speech
Jason Jonkman | NREL

11:45 Aeroelastic analysis of membrane blade via panel-BEM coupling
Mehran Saeedi | TUM

12:05 Fast trailed and bound vorticity modeling of swept wind turbine blades
Ang Li | DTU

12:25 Rotor wake engineering models for aeroelastic applications
Koen Boorsma | ECN part of TNO

12:45 Stability analysis of wind turbines with bend-twist coupled blades
Stefano Cacciola | Politecnico di Milano

13:05 Implementation of an advanced beam model in BHawC
Philippe Jacques Couturier | Siemens Gamesa Renewable Energy

13:25 Conclusive speech
Jason Jonkman | NREL

13:30 Session end

Friday

CM. Control and Monitoring 4

Room: BL.27.02
Chaired by: **Paul Fleming | NREL**
Duration: 110 minutes

11:40 Introductory speech
Paul Fleming | NREL

11:45 Lidar-based closed-loop wake redirection in high-fidelity simulation
Steffen Raach | University of Stuttgart

12:05 ISO.Wind - A monitoring system for wind parks using passive radar
Christian Kress | Fraunhofer IWES

12:25 Large-eddy simulation study of wind farm active power control with a coordinated load distribution
Mehdi Vali | ForWind - University of Oldenburg

12:45 Sparse Sensor Placement for Wind Farm Control
Jennifer Annoni | National Renewable Energy Laboratory (NREL)

13:05 Wind tunnel validation of a closed loop active power control for wind farms
Vlaho Petrovic | ForWind - University of Oldenburg

13:25 Conclusive speech
Paul Fleming | NREL

13:30 Session end

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Stazione accessibile (montascale)
Step-free station (stairlifts)

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S3 Saronno • Milano Bovisa • Milano Cadorna
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