6th International Conference on Wind Turbine Noise 2015

Glasgow, Scotland
20-23 April 2015

Volume 1 of 2

ISBN: 978-1-5108-0670-2

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Some format issues inherent in the e-media version may also appear in this print version.

Printed by Curran Associates, Inc. (2015)

INCE/Europe
Riverside House
4 Oakland Vale
New Brighton, Merseyside CH45 1LQ, UK

Phone: +44 (0)151 638 0181
Fax: +44 (0)151 639 5212

inceeurope@cmrl.demon.co.uk

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

Poster Presentations

Group	Title	Author 1
A - Source Noise - Localisation	The DTU Wind Energy WTN Test Facility....1	Bradley
	Doppler analysis and processing for the localization of low frequency tonal sound sources on blades: An experimental approach....13	Falourd
	Observation of vibration velocity at many parts of wind turbine and relational analysis with propagated sound to surroundings....25	Iwase
	Sound source localization on wind turbines using a single acoustic vector sensor....37	Serraris
B - Source Noise - Measurement	Small Wind Turbines – Comparison of Acoustic Noise Measurements in Accordance with IEC 61400-11 Ed. 3 to BWEA Small Wind Turbine Guideline....47	Broneske
	A new method for determining the wind turbine noise based on the constant divergence of sound pressure level....56	Buzduga
	Field comparison of IEC 61400-11 Wind turbines - Part11: Acoustic noise measurement techniques: Edition 3.0 and Edition 2.1....65	Joswiak
C - Receiver - Sensitivity	Relationship between exposure to wind turbine noise and subjective and objective sleep disorder in southern part in Japan....76	Morimatsu
	Wind turbines - A changed environment....81	Palmer
	Experimental study of relationship between amplitude modulation and detection threshold of wind turbine noise....94	Yoon
D – Receiver - Monitoring	Study of secondary wind shield performance in the field....101	Adcock
	Constraints imposed by and limitations of IEC 61672 for the measurement of wind farm sound emissions....121	Huson (2)
	Wind noise estimation functions for low frequency sound measurment in natural wind at different topography types....132	Kamiakito
	Investigation into the influence of windscreens during sound emission measurements in accordance with IEC 61400-11 ed. 3.0....141	Kaufmann
	Background noise assessment in Utrecht....177	Balkema
	Automated wind farm noise measurement systems with feature analysis....184	Jiggins
E - Low Frequency and Infrasound	A system for measuring wind turbine infrasound emissions....196	Annan
	Stationary wind turbine infrasound emissions and propagation loss measurements....210	Huson (1)
	Environmental Impact Assessment and Management Plan on Wind Turbine Noise in South Korea....226	Park
	Direct experience of low frequency noise and infrasound within a windfarm community....233	Swinbanks
	Measuring wind turbine coherent infrasound....245	Vanderkooy

Monday 20th April 2015 - Oral Presentations		
11:00	Opening	
	Sound Propagation 1	
11:05	**PLENARY** - Wind turbine noise propagation - results of numerical modelling techniques to investigate specific scenarios....261	Sims
11:35	Modeling of ground and atmospheric effects on wind turbine noise....286	Tian
11:55	Metrological validation of the DIN ISO 9613-2 propagation model concerning wind turbine noise....298	Engelen
12:15	Prediction of variability in wind turbine noise calculations....307	Cotte
12:35	Discussion	
13:00	Lunch	
	Sound Propagation 2	
14:00	Directivity noise attenuation values for large wind turbines - Research based on long term measurements....317	Coulon
14:20	Propagation of noise from wind farms according to the Institute of Acoustics' Good Practice Guide - a sensitivity analysis....331	Birchby
14:40	Low-Frequency acoustic near-field of wind-turbines....342	Richarz
15:00	Prediction of infrasound and low frequency noise propagation for modern wind turbines, a proposed supplement to ISO 9613-2....352	Hansen
15:20	Discussion	
15:40	Break	
	Sound Propagation 3	
16:00	Influence of vertical temperature gradient on background noise and on long-range noise propagation from wind turbines....371	Bigot
16:20	Effects of built environment morphology in residential areas on resisting wind turbine noise on building façades....382	Qu
16:40	Discussion	
16:50	Session ends	

Tuesday 21st April 2015 - Oral Presentations		
	Health Effects and Annoyance	
08:30	**PLENARY** – Wind Turbine Noise and Health Study: Summary of Results....391	Michaud
09:10	Findings of the Council of Canadian Academies Expert Panel on Wind Turbine Noise and Human Health....N/A	Howe
09:30	Impact of wind-turbine noise on local residents in mountainous terrain at Lista Windfarm, South Norway....412	Vagene
09:50	Compliance isn't everything....426	Large
10:10	Noise from wind turbines and health effects - Investigation of wind turbine noise spectra....438	Sondergaard
10:30	Discussion	
10:50	Break	
	Regulations 1	
11:10	Comparative analysis of wind turbine noise assessment and rating procedures in the UK, France and the Netherlands....449	Goeme
11:30	The use of cumulative wind turbine noise related planning conditions....472	Mackay
11:50	State of the art and new perspectives for the development of noise regulation of wind farms....483	Schild
12:10	A history of wind turbine noise regulations in the Netherlands....509	van den Berg
12:30	Discussion	
12:55	Lunch	
	Receiving Environment	
13:55	From good practice guidance to solving amplitude modulation for wind turbine noise assessment in the UK....515	Perkins
14:15	Wind turbines - A changed environment....N/A	Palmer
14:35	Modelling of house filter for wind turbine noise....520	Tachibana
14:55	Discussion	
15:10	Break	
	Tonal noise	
15:30	Assessment of tonal components contained in wind turbine noise in immission areas....527	Kobayashi
15:50	Tonal noise from wind turbines....538	Evans
16:10	Reduction of tonalities in wind turbines by means of active vibration absorbers....553	Engelhardt
16:30	Discussion	
16:45	Presentations end	

Wednesday 22nd April 2015 - Oral Presentations - Hall 1		
	Aeroacoustic Noise Source 1	
08:30	**PLENARY** - Basic principles and evidences of wind turbine noise generation mechanisms....N/A	Bertagnolio
09:05	Impact on flow topology of solid and permeable trailing edge serrations at incidence on cambered and symmetric airfoils....560	Arce
09:25	Aeroacoustic simulation of an airfoil in turbulent inflow....576	Illg

Volume 2

09:45	Displacement thickness evaluation for BPM-Type Airfoil-TE noise prediction model....585	Saab
10:05	Simulation of broadband trailing-edge noise - Influence of airfoil shape and flow characteristics....600	Rautmann
10:25	Discussion	
10:45	Break	
	Aeroacoustic Noise Source 2	
11:05	Numerical simulation of airfoil trailing edge serration noise....625	Zhu
11:25	On the measurement and prediction of wind-turbine trailing-edge noise....635	Stalnov
11:45	Development of a high-fidelity noise prediction and propagation model for noise generated from wind turbines....670	Debertshauser
12:05	On predicting wind turbine noise and amplitude modulation using Amiet's theory....677	Sinayako
12:25	Discussion	
12:45	Lunch	
	Aeroacoustic Noise Source 3	
13:45	On the noise prediction of a serrated DU96 airfoil using the Lattice Boltzmann Method....692	van der Velden
14:05	An experimental and numerical parameter study on trailing edge blowing for reduced trailing edge noise....703	Gerhard
14:25	Aeroacoustic wind tunnel experiment for serration design optimisation and its application to a wind turbine rotor....716	Hurault
14:45	Icing of wind turbines and the effect on noise - Long-term measurements....732	Appelqvist
15:05	Experimental characterization of stall noise toward its modelling....743	Bertagnolio
15:25	Discussion	
15:50	Break	
	Small Turbines	
16:10	Noise reduction for small wind turbine by trailing edge modification....755	Yamagata
16:30	Noise directivity from a vertical axis wind turbine....764	Mollerstrom
16:50	Numerical investigation of the aeroacoustics of small vertical axis wind turbines....774	Weber
17:10	Discussion	
17:25	Presentations End	

Wednesday 22nd April 2015 - Oral Presentations - Hall 2		
08:30	See Hall 1	
	Background Noise and Turbine Noise at Receivers -1	
09:05	Background noise map creation through a CFD wind model....786	Bartolazi
09:25	Methods for assessing background sound levels during post-construction compliance monitoring within a community....797	Duncan
09:45	Wind turbine noise measurement: An efficient and reliable method for extracting the wind turbine noise out of the background noise....808	Trefois
10:05	Practical measurement method of wind turbine noise....815	Fukushima
10:25	Discussion	
10:45	Break	
	Background Noise and Turbine Noise at Receivers -2	
11:05	Spectral discrete probability density function of measured wind turbine noise in the far field....825	Ashtiani
11:25	Research into a continuous wind farm noise monitoring system....839	Delaire
11:45	Noise optimized wind park operation....862	Petitjean
12:05	Wind Farm Noise Optimisation Tool....871	Fotheringham
12:25	Discussion	
12:45	Lunch	
	Infrasound	
13:45	Progress report on synthesis of wind turbine noise and infrasound....877	Walker
14:05	Response to simulated wind farm infrasound including effect of expectation....887	Tonin
14:25	Perception and annoyance of low frequency noise versus infrasound in the context of wind turbine noise....901	Hansen
14:45	On the overlap region between wind turbine infrasound and infrasound from other sources and its relation to criteria....927	Leventhall
15:05	Health-based audible noise guidelines account for infrasound and low frequency noise produced by wind turbines....941	Berger
15:25	Discussion	
15:50	Break	
	Regulations 2	
16:10	Noise protection regulations for wind turbines in Germany....956	Bauerdorff
16:30	Sensitivity analysis test on the Italian ISPRA-ARPAT methodology to assess noise impact of operational wind farms....963	Fredianelli
16:50	Parsimonius regulations for wind turbine noise....975	van den Berg (M)
17:10	Discussion	
17:25	Presentations End	

Thursday 23rd April 2015 - Oral Presentations		
	Amplitude Modulation 1	
08:30	**PLENARY** - An overview of recent research on AM and OAM of wind turbine noise....N/A	Madsen
09:00	The Institute of Acoustics' Working Group on Amplitude Modulation - Progress towards an agreed rating and assessment metric....980	Irvine
09:20	Measurements demonstrating mitigation of far-field AM from wind turbines....988	Cand
09:40	Addressing the issue of enhanced amplitude modulation: A developer's perspective....1001	Cassidy
10:00	Current challenges of assessing excess amplitude modulation character in wind turbine noise during EIA/planning phase....1013	di Napoli
10:20	Discussion	
10:45	Break	
	Amplitude Modulation 2	
11:05	Can we really predict wind turbine noise with only one point source?....1025	Ecotiere
11:25	Time-dependent interference: The Mechanism Causing Amplitude Modulation Noise?....1032	Bradley
11:45	Low frequency amplitude modulation related to Doppler frequency shift: An experimental study of a 101m diameter wind turbine in a Swiss valley....1042	Falourd
12:05	Detection of amplitude modulation in Southern Ontario wind farms....1057	Halstead
12:25	Discussion	
12:45	Lunch	
	Amplitude Modulation 3	
13:45	Cotton Farm Wind Farm - long term community noise monitoring project - 2 years on....1068	Stigwood
14:05	Affective response to amplitude modulated wind turbine Noise....1089	Von Hunerbein
14:25	Subjective experiments on the auditory impression of the amplitude modulation sound contained in wind turbine noise....1098	Yokoyama
14:45	Indoor simulation of wind turbine amplitude modulated noise....1108	Fernandez
15:05	Overview of IEEE standard development on amplitude modulation noise measurement....1123	Xue
15:25	Discussion	
15:50	Closing	
16:00	Conference Ends	

Additional Paper

On the Measurement and Prediction of Wind-Turbine Swishing Noise....1132	Cheong