AIRBORNE WIND ENERGY 2021 CONFERENCE
Politecnico Milano
Italy, 22-24 June2022

Final Program

9th International Conference on Airborne Wind Energy – AWEC2021

Social Program – Wednesday, 22 June 2022

Welcome cocktail and visit to Politecnico di Milano Wind Tunnel facility
Where: Bovisa Campus, Building B19
When: 16.30-19.00

Technical Program – Thursday, 23 June 2022

Where: Leonardo Campus, Building 13 ("Trifoglio"), 2nd floor

8.40-9.00	**Conference opening** - Room Colombo (T.2.1) Donatella Sciuto, Executive Vice Rector of Politecnico di Milano Marcello Capra, Italian Ministry of the Ecological Transition (MITE)		
9.00-9.40	**Plenary Session I** - Room Colombo (T.2.1)		
9.00-9.20	Stephan Barth, International Energy Agency's Wind Technology Collaboration Program (IEA Wind TCP)		
9.20-9.40	Paula Nardone, International Renewable Energy Agency (IRENA)		
9.45-11.00	**Regular sessions**		
	Modeling and Control I Room Vespucci (T.2.3)	**Business Development** Room Colombo (T.2.1)	**Resource, siting, acceptance** Room Polo (T.2.2)
9.45-10.00	*Kernel-based Identification of Periodically Parameter-Varying Models of Power Kites* Mingzhou Yin, ETH Zurich	*Airborne wind energy development database* Roland Schmehl, TU Delft	*Comparison of Two Data-driven Airborne Wind Energy Oriented Long-term Weather Forecast Methods* Zhixin Feng, TU Delft
10.00-10.15	*Safety-Critical Hybrid Control of Airborne Wind Energy Systems* Nikolaus Vertovec, University of Oxford	*Rapidly Deployable Airborne Wind Energy Systems for Defense and Disaster Response* Eric J. Lang, Univ. of Dayton Research Institute	*The Airborne Wind Energy Resource Analysis Tool AWERA* Lavinia Thimm, University of Bonn
10.15-10.30	*Estimation of Unknown Aerodynamic Forces of an AWE System* Ahmad Hably, Grenoble-INP	*Lessons Learned in Maturing Novel Renewables* Kester Gunn, RWE Renewables	*Towards flow-field characterization for AWES* Mark Kelly, DTU
10.30-10.45	*Iterative Learning-Based Kite Path Optimization for Maximum Energy Harvesting* James Reed, North Carolina State University	*Fostering International collaboration within IEA Wind TCP Task 48* Stefanie Thoms, Airborne Wind Europe	*Practicalities of Site Selection for an Offshore AWE Demonstration: A Case Study for Ireland* Inés Coca-Tagarro, BlueWise Marine
10.45-11.00	*Fault-tolerant Control of Airborne Wind Energy Systems with Quadrotor/Fixed-Wing UAV Configuration* Tareg Mohammed, Politecnico di Milano	*True 3D high density webbing inflatable structures* Rudo Enserink, enserinkdesign.com	*Social Acceptance of Airborne Wind Energy* Helena Schmidt, TU Delft
11.00-11.20	**Coffee Break - main hall**		

Technical Program – Thursday, 23 June 2022

Where: Leonardo Campus, Building 13 ("Trifoglio"), 2nd floor

11.20-12.35	**Regular sessions**		
	Modeling and Control II Room Vespucci (T.2.3)	**Company Developments** Room Colombo (T.2.1)	**Aerodynamics and Structure I** Room Polo (T.2.2)
11.20-11.35	*Kite Path–following with L_0 and L_1 Controllers Tested on a Small–scale Prototype* Sérgio Vinha, Universidade do Porto	*First Airborne Wind Energy operation on a tropical island* Joep Breuer, Kitepower BV	*Flying a rigid kite with a single tether attachment point* Tallak Tveide, KiteMill
11.35-11.50	*Model Predictive Path–Following Control of Airborne Wind Energy Systems with Guaranteed Stability* Manuel C.R.M. Fernandes, Universidade do Porto	*Polar Wind Highways* Ignacio Oficialdegui, Windsled	*High fidelity Fluid-Structure Interaction Simulation of a Multi-megawatt Airborne Wind Energy Reference System* Niels Pynaert, Ghent University
11.50-12.05	*Quantifying AWE Optimal Control Problem Tractability with Simple Vortex Models* Rachel Leuthold, University of Freiburg	*Rotary Kite Turbine Development* Roderick Read, Windswept and Interesting Ltd	*Improving Lifting-Line/Vortex-Step Methods for Kite Applications using 2D Unsteady Thin Airfoil Theory Results* Mac Gaunaa, DTU
12.05-12.20	*ICM-autoKite Project: Control approaches for an automated kite propulsion* Franziska Hein, University of Stuttgart	*Technical Development in Kitemill* Espen Oland, Kitemill	*Combined Experimental and Numerical Aerodynamic Optimisation of High-Performance Rigid-Wing AWE Systems* Denes Fischer, Technical University Berlin
12.20-12.35	*Automated Power Cycles in Daylong Operation at SkySails Test Site* Manfred Quack, SkySails Power GmbH	*Save Japan from a Future Social Crisis! 'Mothership' Project Current Development Progress* Eiji Itakura, Toyota Motor Corporation	*A Semi-Empirical Aerodynamic Model Based on Dynamic Stall for Rigid-Framed Delta Kites during Figure-of-Eight Maneuvers* Iván Castro-Fernández, Universidad Carlos III de Madrid
12.35-12.45	**Conference group photograph – Outside Building 13**		
12.45-14.00	**Lunch – Ground floor and outside**		
13.15-14.00	**European Academy of Wind Energy Technical Committee meeting** – Room T.0.3		
14.00-15.30	**Plenary Session II** - Room Colombo (T.2.1)		
14.00-14.30	Stephan Wrage, Skysails Power GmbH		
14.30-14.35	**OEM presentations**: *TwingTec's path to commercialization* Rolf Luchsinger, TwingTec AG		
14.35-14.40	*Kitekraft: Building Flying Wind Turbines* Florian Bauer, kiteKRAFT GmbH		
14.40-15.15	**Panel Discussion I**, moderated by Kristian Petrick, Airborne Wind Europe		
15.15-15.30	**Poster Spotlights I**		
15.30-16.00	**Coffee Break - main hall**		

Technical Program – Thursday, 23 June 2022

Where: Leonardo Campus, Building 13 ("Trifoglio"), 2nd floor

15.40-16.40	**Poster Session I and Coffee Break (main hall)**		
	Magnus Effect Kites: Optimal Reel-Out Speeds for Cross-Wind Power Production and Early Simulation & Test Results Garrett Smith, Wind Fisher SAS	*Modelling and Sizing of a Hybrid Power Plant using Airborne Wind Energy Systems* Sweder Reuchlin, TU Delft	*AirWing, a self-regulating control system for kites* Ingo Mewes, Hochschule für Schauspielkunst "Ernst Busch" Berlin
	Modeling and Control of Airborne Wind Energy Systems using Prandtl lifting line and actuator line/curve models Jean-Baptiste Crismer, Université catholique de Louvain	*Fatigue Life Optimized Electromechanical Tether Design for Multimegawatt AWE* Stefan Neuhold, swiss inventix GmbH	*Economic Potential of applying Circular Economy to AWE* Franco Vernazza, University of Buenos Aires
	Using the Lidar-validated hindcast model NORA3 for resource estimates of airborne wind energy systems Jan Markus Diezel, University of Bergen	*An Efficient Optimal Control Method for Airborne Wind Energy Systems with a Large Number of Slowly Changing Subcycles* Jakob Harzer, University of Freiburg	*Development of an Aeroelastic Simulation Framework for Leading Edge Inflatable Kites* John Watchorn, TU Delft
	Multi element airfoil design for an AWE rigid kite Agustí Porta Ko, Kitemill and TU Delft	*Production Cycle Optimization for Pumping Airborne Wind Energy* Rodolfo Mathis, Politecnico di Milano	*Modelling aeroelastic deformation of inflatable membrane kites* Jelle Poland, TU Delft
	Low and High Fidelity Aerodynamic Simulations for Airborne Wind Energy Box Wings Gabriel Buendia, TU Delft		
16.45-18.00	**Regular sessions**		
	Performance and optimization Room Vespucci (T.2.3)	**Techno-economic studies** Room Colombo (T.2.1)	**Prototyping and operation** Room Polo (T.2.2)
16.45-17.00	*Power Smoothing in Utility-Scale Airborne Wind Energy Trajectory Optimization* Jochem De Schutter, University of Freiburg	*NREL Airborne Wind Energy Workshop and Technical Report 2021* Jochem Weber, National Renewable Energy Laboratory	*Status of UC3M Testbed for the Aerodynamic Characterization of Kites Applied to AWES* Francisco De Los Ríos-Navarrete, Universidad Carlos III de Madrid
17.00-17.15	*Power Losses Analysis of AWESs via a Novel Quasi-Analytical Dynamic Model* Gregorio Pasquinelli, Politecnico di Milano	*Airborne Wind Energy for Sea Water Desalination: A Techno-Economic Study* Mahdi E. Salari, University College Cork	*Maximizing visibility of AWE systems for airspace users* Corey Houle, TwingTec AG
17.15-17.30	*Multidisciplinary design and optimization of fixed-wing AWESs* Filippo Trevisi, Politecnico di Milano	*Life-Cycle Analysis of an Airborne Wind Energy System* Kristian Petrick, Airborne Wind Europe	*Rotational Launch and Landig: Flight tests at EnerKite* Christian Gebhardt, Enerkite GmbH
17.30-17.45	*Circular AWE Parks with High Ground Area Power Density* Moritz Diehl, University of Freiburg	*A reference economic model for airborne wind energy systems* Rishikesh Joshi, TU Delft	*SkyPower100 - Realization of a fully automatic AWES (100 kW)* *Patrick Junge, Skysails Power GmbH*
17.45-18.00	*Optimal reeling control for pumping airborne wind energy systems without wind speed feedback* Lorenzo Fagiano, Politecnico di Milano	*Energy Mix and Security Benefits of Airborne Wind Energy for Net Zero* Will Kennedy Scott, Swift Airgen Ltd.	*Concepts for Obstruction Marking and Demand-Oriented Obstruction Avoidance to Ensure a Safe Operation of AWE Systems* Nicole Allgaier, Enerkite GmbH

Social Program – Thursday, 23 June 2022

Conference banquet
Where: Osteria del Treno, Via S. Gregorio, 46, 20124 Milano MI
When: 19.00-22.00

Technical Program – Friday, 24 June 2022

Where: Leonardo Campus, Building 13 ("Trifoglio"), 2nd floor

8.35-9.40	**Plenary Session III -** Room Colombo (T.2.1)		
8.35-8.50	Kristian Petrick, Airborne Wind Europe, and Mike Blanch, BVG Associates		
8.55-9.40	Philip Bechtle, University of Bonn		
9.45-11.15	**Regular sessions**		
	Modeling and Control III Room Vespucci (T.2.3)	**System Design** Room Colombo (T.2.1)	**Aerodynamics and Structure II** Room Polo (T.2.2)
9.45-10.00	*Experimental Validation on Using Drones for the Take-off and Landing Phases of an AWE System* Zakeye Azaki, Grenoble-INP	*Rotation compensator based cyclic pitch control for Rotary Airborne Wind Energy Systems* Christof Beaupoil, someAWE Labs S.L.	*High-fidelity Tether Models for Airborne Wind Energy* Michael McWilliam, DTU
10.00-10.15	*Trajectory Tracking Controller Design and Simulation of a Tethered Aircraft* Anıl Sami ÖNEN, Middle East Technical University	*Design Analysis of a Rotary Airborne Wind Energy System* Oliver Tulloch, University of Strathclyde	*Analytical wake models for crosswind kites* Mojtaba Kheiri, Concordia University
10.15-10.30	*C++ Based Systems Engineering Framework as a Key Approach Towards Efficient, Reliable, and Autonomous Flying Wind Turbine Products* Florian Bauer, kiteKRAFT GmbH	*Non-intrusive modeling of an AWE generator's bidirectional DC/DC converter* Joey Naranjo, Kitenergy Srl	*An Entrainment-Based Model for Annular Wakes, with Applications to Airborne Wind Energy* Sam Kaufman-Martin, University of California, Santa Barbara
10.30-10.45	*Julia Kite Power Tools* Uwe Fechner, Aenarete - Smart Wind	*Drivetrain concepts for pumping airborne wind energy systems* Rishikesh Joshi, TU Delft	*Aero-structural design tailoring of composite AWE wings* Ashwin Candade, Enerkite GmbH
10.45-11.00	*Some modelling and control aspects of rotational starting and landing* Maximilian Ranneberg, Enerkite GmbH	*The ICM-autoKite Project: Developing an automated kite propulsion system for the KITE GAS/FUEL SHIP and economic green hydrogen production* Klaus Heudorfer, University of Stuttgart	*The Daedalus project: AWE tether engineering method substantiated* Rigo Bosman, RIGO Ropes
11.00-11.15	*Optimal flight path for Fly-Gen Airborne Wind Energy Systems* Filippo Trevisi, Politecnico di Milano	*The Pyramid, a TRPT rethink* Oliver Tulloch, Windswept and Interesting Ltd	*Performance Investigation of Utility-Scale Airborne Wind Energy Farms using Large-Eddy Simulations* Thomas Haas, KU Leuven
11.15-11.40	**Coffee Break - main hall**		

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11.40-12.40	**Plenary Session IV -** Room Colombo (T.2.1)
11.40-12.25	Chris Vermillion, North Carolina State University
12.25-12.40	**Poster Spotlights II**
12.40-14.00	**Lunch – Ground floor and outside**
13.30-14.00	**Airborne Wind Europe members' meeting –** Room T.0.3
14.00-15.15	**Poster Session II**
	On control of phase transitions in Airborne Wind Energy Systems Nicolas Kessler, Politecnico di Milano
	KGM1 – A different approach to the Airborne Wind Energy technology Marco Ghivarello, GHIVA Prog. CAD
	Dynamics of tethered airborne wind energy systems Mojtaba Kheiri, Concordia University
	Predictive Control of a Morphing Airborne Wind Energy System Jacob B. Fine, North Carolina State University
	Ground Station Control of an Airborne Wind Energy System in a Complete Operational Cycle Ali Arshad Uppal, Universidade do Porto
	Open-source parametric FE meshing tool for fixed-wing AWE kites Dylan Eijkelhof, TU Delft
	Airborne Wind Energy Farm Layout and Optimization Luís A.C. Roque, Universidade do Porto
	Swinging Motion of a Flexible Membrane Kite with Suspended Control Unit During Turning Maneuvers Mark Schelbergen, TU Delft
	Achieving ultralight, rigid, durable, low-cost composite AWE kites with efficient design and manufacturing Florian Breipohl, Enerkite GmbH
	Annual Wind Resource Assessment for an Airborne Wind Energy System Edgar Uriel Solís-Magallanes, Metropolitan Polytechnic University of Hidalgo
	Design of an Airborne Wind Energy System for Mars Habitats Mario Rodriguez, TU Delft
	Fast Aeroelastic Model of a Leading-Edge Inflatable Kite Uri Cayon, TU Delft
14.45-15.15	**Coffee Break (main hall)**
15.15-16.00	**Plenary Session V -** Room Colombo (T.2.1)
	OEM presentations:
15.15-15.20	*Kitepower's journey to the Islands and beyond* Johannes Peschel, Kitepower BV
15.20-15.25	*Kitemill - commercial development* Thomas Hårklau, Kitemill AS
15.25-15.30	*A Multidimensional Trade-off* Gian Mauro Maneia, Kitenergy Srl
15.30-16.00	**Panel Discussion II**, moderated by Kristian Petrick, Airborne Wind Europe
16.00-16.15	**Farewell**

Registration package: A welcome desk to collect the registration package will be available in the following times:

- 16.30-18.00 on 22 June 2022 close to the Wind Tunnel Facility, Bovisa Campus, Building B19
- 8.30-16.00 on 23 June 2022 in the main hall, Leonardo Campus, Building 13 ("Trifoglio"), 2nd floor
- 8.30-14.00 on 24 June 2022 in the main hall, Leonardo Campus, Building 13 ("Trifoglio"), 2nd floor