CURRICULUM VITAE

Hans Holger Hundborg Koss

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IN BRIEF

Hans Holger Hundborg Koss is an Associate Professor at the Department of Civil Engineering, Section for Structures and Safety, at the Technical University of Denmark (DTU) in Kgs. Lyngby, Denmark. His long-standing research experience is in the field of Wind Engineering and Structural Dynamics with particular focus on the simulation of wind loads on buildings and structures (experimentally and numerically), their static and dynamic response and the climatic behaviour of the urban environment. With his design work on a specialised Climatic Wind Tunnel in 2008-2009, his research expanded to cold climate effects on aerodynamic performance of bridge cables and wind turbine wings, especially related to atmospheric icing. With the investigation of topology optimisation of minimal structures under stochastic loading in 2016, he embarked on the field of 3D additive manufacturing. This activity lead subsequently to the development of an innovative biopolymer-based building material allowing a high degree of freedom in the printing process. His teaching covers Structural Mechanics, Wind Engineering, Wind Tunnel Testing, Structural Engineering, Probabilistic Modelling, Urban Environments and Experimental Structural Mechanics on both basic and advanced level.

Born in 1966 in Essen, Germany, he graduated at the University of Bochum in 1994 at the Faculty of Civil Engineering on non-linear action effects on industrial steel-frame buildings. The subsequent research work on the field of building aerodynamics was conducted at wind-tunnel laboratories in France and Denmark and finalised in 2000 at the University of Bochum with a doctoral thesis about the influence of the simulation of the natural wind on the overload risk prediction of steel-frame buildings. From February 2000, he was employed at the Danish Maritime Institute, which today is the Division of Maritime Industry at FORCE Technology. In 2005 he started teaching as an external lecturer in a special course on seismic and wind engineering at the Technical University of Denmark (DTU) and from September 2007 he was employed as External Associate Professor at the Department of Civil Engineering (DTU-Byg) where he since July 2008 he holds a full position as Associate Professor. From February 2014 to March 2018, he was head of the Section for Structural Engineering and since 2013, he chairs the Danish Wind Engineering Society (DSVI).

RESEARCH GROUP

Climate and Structures Research Group
http://www.windengineering.byg.dtu.dk

MEMBERSHIPS (main)

Danish Wind Engineering Society (DSVI), chairman
Windtechnological Society (WtG) – Germany, Austria, Switzerland

SPECIAL RESEARCH PROJECTS (recent)

"Optimised constructions using semi-automated designing and manufacturing tools for minimum resource consumption"
Duration: 2019-2021, Supported by: VELUX Foundation, Program: VILLUM Experiment

"**Non-invasive assessment of structural condition of aged balconies by dynamic testing**"
Duration: 2018-2019, Supported by: Grundejernes Investeringsfond & Realdania Fund

"Development and testing of organic concrete for lightweight structures"
Duration: 2018-2019, Supported by: Engineer Captain Aage Nielsen's Family Fund

PHD. PROJECTS

Christ, Julian, **Opt. constructions using semi-autom. designing and manufacturing tools for minimum resource consumption**
Period: December 2018 – November 2021, Project status: Current, Role: Main supervisor

Lubomir Matejícka (Aarhus Univeristy): **Aerodynamic stability and icing of bridge cables with concave fillets**
Period: 2018 – 2021, Project status: Current, Role: Co-supervisor

Skytte Thordal, Marie: **Determination of wind load on high-rise buildings by applying CFD**
Period: June 2016 – May 2019, Project status: Completed, Role: Main supervisor

Fiebig, Jennifer: **SUB 0° Snow and wind – a dimension in arctic built environment**
Period: 2015 – 2018, Project status: Current, Role: Main supervisor

Burlina, Celeste: **Aerodynamics and icing of bridge cables with concave fillets**
Period: 2014 – 2018, Project status: Completed, Role: Supervisor

Nielsen, Alf L.: **Urban Environment – Development of Comfort Criteria for Urban Planning**
Period: 01-12-2012 to 30-11-2015, Project status: Completed, Role: Main supervisor

Jørgensen, Nina Gall: **Integration of CFD in Structural and Architectural Wind Engineering**
Period: 01-11-2009 to 31-12-2013, Project status: Completed, Role: Main supervisor

Kleissl, Kenneth: **Cable Aerodynamic Control**
Period: 01-10-2009 to 30-09-2012, Project status: Completed, Role: Co-supervisor

Matteoni, Giulia: **Understanding of Bridge Cable Vibration Mechanisms under varying Meteorological Conditions**
Period: 01-05-2010 to 30-04-2013, Project status: Completed, Role: Co-supervisor

Gjelstrup, Henrik: **Understanding and Simulation wind-induced Vibrations of Iced Vertical Cables**
Period: 2006 to 2011, Project status: Completed, Role: Co-supervisor

DEVELOPMENT / RESEARCH PROJECTS

Spray System for In-cloud Icing
Development of special equipment to simulate and control in-cloud conditions for atmospheric icing in the Climatic Wind Tunnel.
Period: 2011 – ongoing, Role: Chief researcher and designer

National Wind Tunnel
Development and design of a new national wind tunnel facility dedicated for research in the field of wind energy. The facility is designed and operated by the Technical University of Denmark, headed by the Department of Wind Energy.
Period: 2008 – 2016, Role: Member of technical committee

Climatic Wind Tunnel
Development of a new wind tunnel facility to investigate the effect of climatic boundary conditions such as rain, snow and ice on the wind load on structural bridge cables and their dynamic response. The Development and design was conducted on behalf of FORCE Technology (facility operator) and DTU (facility user) commissioned by Femmern Bælt A/S and Storebælt A/S.
Period: 2008 to 2011, Role: Aerodynamic and Technical Design (chief designer)

PUBLICATIONS

- *IN PREPARATION:*

Koss, H.H. “Understanding urban environments and developing methods for sustainable urban design” *In preparation for Journal of Building and Environment*

Koss H.H., Smidemann, J.C. “Ship Wind Climate – Generic method for risk assessment of wind-borne nuisance and health hazards on-board ships”. In preparation for *Journal of Wind Engineering and Industrial Aerodynamics*

Fiebig, J., Koss, H.H. “Nuuk Cube Field Experiment – Part1: Meteorological Observations”. In preparation to be submitted to Journal of Cold Regions Science and Technology

Fiebig, J., Koss. H.H. “Nuuk Cube Field Experiment – Part2: Snow Accumulation Monitoring”. In preparation to be submitted to Journal of Cold Regions Science and Technology

- *SUBMITTED & IN REVIEW:*

Koss, H.H., Dinesen, R.S. (2020). “Photometric Scanning and Reproduction of Ice Accretion on a Bridge Cable Section”. Accepted for presentation on BBAA IX, Birmingham, UK, 2020 (re-scheduled due to CORONA)

- *PUBLISHED:*

Matejicka, L., Greorgakis, C.T., Koss, H.H., 2022. “Cross-flow aerodynamics of bridge cables with wire meshes”. Submitted to Journal of Wind Engineering and Industrial Aerodynamics, Vol.223 (104941)

Koss, H.H., Kim, T., Larsen, S.V., Georgakis, C.T., 2021. “10 Years Research and Applications in the Climatic Wind Tunnel”. Proceedings of the Danish Society for Structural Science and Engineering (Dansk Selskab for Bygningsstatik), November 2021

Friis, T., Katsanos E.I., Saberi, M., Koss H.H., 2021. “Two-level friction damping and its application for passive multi-functional vibration control of high-rise buildings”. Engineering Structures. 239, 27p., 112310

Matejícka, L., Georgakis, C.T., Koss, H.H., Egger, P., 2020. “Ice-shedding and aerodynamic investigations of bridge cables with steel wire meshes”. Proceedings of IABSE Congress – Resilient technologies for sustainable infrastructure September 2-4, 2020, Christchurch, New Zealand

Rossi, A., Jubayer, C., Koss, H.H., Arriaga, D., Hangan. H., 2020. “Combined effects of wind and atmospheric icing on overhead transmission lines. Journal of Wind Engineering and industrial Aerodynamics 204, 15p. 104271

Skytte Thordal, M., Bennetsen, J.C., Capra, S., Kragh, A.K., Koss, H.H., 2020. “Towards a standard CFD setup for wind load assessment of high-rise buildings: Part 2 – Blind test of chamfered and rounded corner high-rise buildings” Journal of Wind Engineering and Industrial Aerodynamics. 205, 14p., 104282

Thordal, M.S., Bennetsen, J.C., Capra, S., Koss, H.H., 2020. “Towards a standard CFD setup for wind load assessment of high-rise buildings: Part 1 - benchmark of the CAARC building.” J. Wind Eng. Ind. Aerod., 104283

Thordal, M.S., Bennetsen, J.C., Capra, S., Koss, H.H., 2020. “Engineering approach for a CFD inflow condition using the Precursor Database method.” J. Wind Eng. Ind. Aerod. (104210), 203.

Christ, J., Ottosen, L.M., Koss, H.H. “A concrete composite from biologically based binders and mineral aggregates for constructional 3D-printing” Proc. ICSBM 2019: 2nd International Conference on Sustainable Building Materials, Vol.5, p.93-105 119

Christ, J., Fernandoy-Bak, J., Fiebig, J., Koss, H.H., “On the Ecology of Climate & Structures“ Proc. IASS Annual Symposium 2019 – Structural Membranes 2019 Form and Force 7-10 October 2019, Barcelona, Spain

Son, C., Koss, H.H., Kim, T., „Development of 3D icing simulation code for wind turbines” Proc. International Workshop on Atmospheric Icing of Structures (IWAIS) 2019, Iceland

Koss, H.H, Tschannett, S., Ratheiser, M., Ruschweyh, H., Lieb, R.-D., Krus, H.W., Höffer, R., „Development of a new guideline for the assessment of wind comfort in urban areas. Proc. 15th Int. Conf. on Wind Engineering, Beijing, China, 2019

Fiebig, J., Koss, H.H., “Experimental methods of snow accumulation in wind tunnel testing”, Proc. 15th Int. Conf. on Wind Engineering, Beijing, China, 2019

Thordal, M.S., Bennetsen, J.C., Koss, H.H., "Standard CFD setup of a precurser database model". Proc. 15th Int. Conf. on Wind Engineering, Beijing, China, 2019

Christ, J., Koss, H.H., Ottosen, L.M., “A concrete composite from biologically based binders and mineral aggregates fro constructional 3D-printing”. Proc. 2nd Int. Conf. of Sustainable Building Materials, Eindhoven, NL, 2019

Thordal, M.S., Bennetsen, J.C., Koss, H.H., Review of practical use of the determination of wind load on high-rise buildings by applying CFD. *Journal of Wind Engineering and Industrial Aerodynamics Vol.186, 2019, 155-168*.

Koss, H.H., 2018. Understanding urban environments for sustainable urban design. Proc. *8th International Conference on Environmental Effects on Building and People (EEBP8)*, 2018, Cracow, Poland

Koss, H.H., 2017. Einfluss der Oberflächenstruktur auf das aerodynamische Verhalten von vereisten Brückenseilen [German translation of: Effect of surface design on aerodynamic forces of ices bridge cables, 2014]. *15th Symposium of the Windtechnological Society WtG* (15. D-A-CH Tagung), 19/20 October 2017, Technical University of Denmark (DTU), Denmark

Fiebig, J., Koss, H.H., 2017. Grundsatzüberlegung einer experimentellen Versuchsmethode für das Phänomen der Schneeanhäufung um und an Gebäuden im Windkanal mit Schnee-Ersatzmaterial [Fundamental considerations on an experimental method to investigate snow accumulation on and around buildings with snow-substitution materials]. *15th Symposium of the Windtechnological Society WtG* (15. D-A-CH Tagung), 19/20 October 2017, Technical University of Denmark (DTU), Denmark

Matejicka, L., Georgakis, C.T., Koss, H.H., Schwarz, A., Egger, P., 2017. Preliminary evaluation of the ice shedding properties of bridge cable surfaces. In: *ISDAC 2017, International Symposium on the Dynamics and Aerodynamics of Cables*, 2017, Porto, Portugal

Bak, J., Christ, J., Shepherd, P., Koss, H.H., 2017. Cases of Lightweight Structures for Polar Areas. In: *IASS Annual Symposium*, International Association of Shell and Spatial Structures, 2017

Koss, H.H., Jørgensen, L., Jørgensen, P., Rasmussen, M.K., 2017. Benchmark for self-accreditation. In: *7th European-African Conference on Wind Engineering (EACWE)*, 2017, Liege, Belgium.

Fiebig, J., Koss, H.H., 2017. Experimental investigation of snow accumulation. In: *7th European-African Conference on Wind Engineering (EACWE)*, 2017, Liege, Belgium.

Mualla, I.H., Koss, H.H., 2017. Vibration control of novel passive multi-joints Rotational Friction Dampers. In: *Eurosteel 2017*, Vol.1, pp.1473-1482, Copenhagen, 2017

Koss, H.H. 2016. Investigating the influence of cold climate conditions on structural dynamics. In: *International conference on Materials, Systems and Structures in Civil Engineering (MSSCE)*, 15-29 August 2016, Lyngby, Denmark.

Fiebig, J., Koss, H.H., 2016. Developing experimental method for investigating snow deposition around buildings using snow substitutes”. In: *International Conference on Snow Engineering (ICSE) 2016*, June 14-17, 2016, Nantes, France.

Koss, H.H., 2015. Überlegungen zur Entwicklung einer Windkomfortrichtlinie [Considerations for the development of a wind comfort guideline]. In: *14th Symposium of the Windtechnological Society WtG* (14. D-A-CH Tagung), October 5/6 2015, Technical University of Braunschweig, Germany

Koss, H. H., Srouji, R., 2015. Scaling Issues in the Determination of Wind Loads on Lattice Masts. In: *14th International Conference on Wind Engineering (ICWE)*, June 21-26, 2015, Porto Alegre, Brazil

Christensen, M.R.L., Olesen, C.B., Koss. H.H., 2015. Wind load and dynamic response of a low-rise building: A comparative study on the state of the art. *Journal of the Danish Society for Structural Science and Engineering*, July, 2015

Demartino, C., Koss, H.H., Ricciardelli, F., 2015. Effects of ice accretion on the aerodynamics of bridge cables. *Journal of Wind Engineering and Industrial Aerodynamics*, Vol: 138, pages: 98-119

Koss, H., 2014. Effect of surface design on aerodynamic forces of ices bridge cables. In: *Symposium on the Dynamics and Aerodynamics of Cables (SDAC)*, September 25/26, 2014, Technical University of Denmark

Koss, H.H., Jensen, L.B., Nielsen, T.A.S., 2014. Quantitative and creative design tools for urban design in cold and windy climates. In: *ARTEK Event 2014*, 2014, Sisimiut, Greenland

Fiebig, J., Koss, H.H., 2014. Architectural Design in Arctic Regions - Issue of wind-driven snow in a built environment for sustainable urban planning. In: *DTU Sustain Conference 2014*, 2014, Lyngby

Koss, H.H., Henningsen, J.F., Olsen, I., 2013. Influence of Ice Accretion on Bridge Cable Aerodynamics. In: *15th International Workshop on Atmospheric Icing of Structures (IWAIS)*, St. John's, Newfoundland and Labrador, September 8-11, 2013

Hudecz, A., Koss, H.H., Hansen, M.O., 2013. Ice Accretion on Wind Turbine Blades. In: *15th International Workshop on Atmospheric Icing of Structures (IWAIS)*, St. John's, Newfoundland and Labrador, September 8-11, 2013

Koss, H.H., Lund, M.S.M., 2013. Experimental Investigation of Aerodynamic Instability of Iced Bridge Cables. In: *6th European and African Conference on Wind Engineering (EACWE)*, Robinson College, Cambridge, UK

Demartino, C., Koss, H.H., Ricciardelli, F., 2013. Experimental study of the effect of icing on the aerodynamics of circular cylinders – Part I: Cross-flow. In: *6th European and African Conference on Wind Engineering (EACWE)*, Robinson College, Cambridge, UK

Georgakis, C.T., Jakobsen, J., Koss, H.H., Larsen, S.V., Macdonald, J., Ricciardelli, F., Svensson, E., 2013. Understanding and controlling wind-induced vibrations of bridge cables: Results from the Femern Crossing research project. In: *6th European and African Conference on Wind Engineering (EACWE)*, Robinson College, Cambridge, UK

Jørgensen, N.G., Koss, H.H, Bennetsen, J.C., 2012. Embedded-LES and experiment of turbulent boundary layer flow around a floor-mounted cube. In: *7th International Colloquium on Bluff Bodies Aerodynamics and Applications (BBAA)*, Shanghai, September 3-6, 2012

Koss, H.H., 2011. Neuer klimatischer Windkanal zur Untersuchung von Kabelschwingungen – Entwurf, Konstruktion und erste Versuche [New climatic wind tunnel for studies on cable vibration – design, construction and first tests]. In: *12th Symposium of the Windtechnological Society WtG* (12. D-A-CH Tagung), Nov. 10/11, 2011, Aachen, Germany

Koss, H.H., Matteoni, G., 2011. Experimental investigation of aerodynamic loads on iced cylinders. In: *9th International Symposium on Cable Dynamics (ISCD)*, Shanghai, October 18-20, 2011

Koss, H.H., Gjelstrup, H., Georgakis, C.T., 2012. Experimental study of ice accretion on circular cylinders at moderate low temperatures. *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.104-106, pp.540-546, special issue from 13th International Conference on Wind Engineering (ICWE) 2011, Amsterdam, NL

Jørgensen, N.G., Koss, H.H., 2011. Development of human comfort criteria for environmental conditions in urban areas. In: *13th International Conference on Wind Engineering (ICWE)*, 2011, Amsterdam, NL

Krogsbøll, A., Simonsen, C., Christensen, J.E., Larsen, T.B., Goltermann, P., Koss, H.H., Sand, J., 2011. CDIO Projects in Civil Engineering Study Program at DTU. In: *7th International CDIO Conference*, Technical University of Denmark, Copenhagen, June 20 - 23, 2011

Koss, H.H., Georgakis, C.T., Larsen, S.V., 2010. Bridge Cables – and Wind, Rain, Ice and Snow. *Wind Tunnel International*, 2010

Georgakis, C.T., Koss, H.H., Ricciardelli, F., 2009. Design Specifications for a Novel Climatic Wind Tunnel for the Testing of Structural Cables. In: *8th International Symposium on Cable Dynamics (ISCD)*, 2009

Georgakis, C.T., Støttrup-Andersen, U., Johnsen, M., Nielsen, M.G., Koss, H.H., 2009. Drag coefficients of lattice masts from full-scale wind-tunnel tests. *5th European African Conference on Wind Engineering (EACWE)*, 2009

Gjelstrup, H., Larsen, A., Georgakis, C.T., Koss, H.H., 2008. A new general 3DOF quasi-steady aerodynamic instability model. *6th International Colloquium on Bluff Bodies Aerodynamics and Applications (BBAA)*, Politecnico di Milano, Italy, 2008

Koss, H.H., 2006. On differences and similarities of applied wind comfort criteria. *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.94, Issue 11, November 2006, p.781-797.

Georgakis, T.C.; Koss, H.H., 2005. Tuned Liquid Dampers for the European Court of Justice, Luxembourg. *Structural Engineering International*, Vol.15, No.4, November 2005, p.228-231.

Blackmore, P.; Deplech, P.; Willemsen, E.; Koss, H.H.; Sanz, A., 2005. A practical case study for comparison of criteria used in pedestrian wind comfort assessment. In: *4th European & African Conference of Wind Engineering (EACWE)*, Prague, 2005

Koss, H.H.; Georgakis, T.C., 2005. Wind Engineering on the new European Court of Justice. In: *4th European & African Conference of Wind Engineering (EACWE)*, Prague, 2005

Koss, H.H., 2004. Investigation of Maritime Helicopter Operations. *The Scandinavian Yearbook of Maritime Technology 2004*, Scandinavian Shipping Gazette, October 1, 2004

Koss, H.H., 2004. Bestimmung von Entwurfswindlasten für flexible Strukturen [Determination of design wind loads on flexible structures]. In: *8th Symposium of the Windtechnological Society WtG* (8. D-A-CH Tagung). Technical University of Darmstadt, November 2003.

Koss, H.H., 2003. Windkomfortkriterien im Vergleich [Comparison of wind comfort criteria]. In: *8th Symposium of the Windtechnological Society WtG* (8. D-A-CH Tagung), November 20/21, 2003, Technical University of Darmstadt.

Koss, H.H., Sahlmen, J., 2002. Methods in pedestrian wind comfort assessment; theoretical and practical comparisons. In: *COST C14 Conference*, 2002, CSTB Nantes, France

Jensen, K.; Koss, H.H.; Søndergaard, T., 2001. Feasibility study of wind screens in harbours. In: *3rd European African Conference of Wind Engineering (EACWE)*, 2001, Eindhoven, The Netherlands

Kasperski, M.; Koss, H.H., 2000. Scaling effects on the prediction of wind actions and action effects of low-rise buildings. In: *4th International Colloquium on Bluff Body Aerodynamics and Applications (BBAA)*, September 2000, University of Bochum, Germany

Kasperski, M.; Koss, H.H., 1999. Influence of a scaling mismatch on wind induced action and action effects. In: *10th International Conference on Wind Engineering (ICWE)*, 1999, Copenhagen, Denmark

Kasperski, M.; Koss, H.H., 1997. Failure risk of portal frames under wind load applying a dynamic plastic analysis. In: *Structural Safety and Reliability – ICOSSAR'97*, 1997, Kyoto, Japan

Kasperski, M.; Koss, H.H., 1997. Versagenskriterien von Stahlrahmen unter Windlast bei Verwendung dynamischer Traglastanalyse [Failure criteria of steel frames under wind load using dynamic structural analysis]. In: *5th Symposium of the Windtechnological Society WtG* (5. D-A-CH Tagung), November 1997, Braunschweig, Germany

Kasperski, M.; Koss, H.H., 1997. Non-Linear Effects on Portal Frames under ultimate Wind Load. In: *2nd European & African Conference on Wind Engineering (EACWE)*, 1997, Genova, Italy

Kasperski, M.; Koss, H.H.; Sahlmen, J., 1996. BEATRICE Joint Project: Wind Action on Low-Rise Buildings – Part 1: Basic Information and first results. *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.64, 1996, pp. 101-125

Kasperski, M.; Koss, H.H., 1996. Non-linear dynamic analysis of portal frames under wind action. In: *EURODYN'96 „Structural Dynamics"*, Balkema, Rotterdam, ISBN 9054108134

Kasperski, M.; Koss. H.H.; Holmes, J.D., 1995. Limit state design of low-rise portal frames using wind tunnel tests. In: *9th International Conference on Wind Engineering (ICWE),*1995, New Delhi, India

Kasperski, M.; Koss, H.H., 1994. Non-linear analysis of portal frames under wind load. In: *American Society of Civil Engineers (ASCE)*, 1994, Sydney, Australia