Clara García-Sánchez

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Assistant Professor at TU Delft, Delft, The Netherlands

EDUCATION

Antwerpen University, Belgium - Von Karman Institute for fluid dynamics, Belgium 09/2017
Doctor in philosophy, physics
Thesis: "Quantifying inflow uncertainties for computational fluid dynamic simulations of dispersion in the atmospheric boundary layer"

Von Karman Institute, Belgium 06/2012
Research Master in fluid dynamics (MaM)
Thesis: "Large eddy simulations of the offshore boundary layer using the Weather Research and Forecasting model"

Polytechnic University of Valencia, Spain 07/2011
Aeronautic Engineer (bachelor and MS)
Thesis: "Mesh design and computational fluid dynamics analysis of an S-inlet for Blended Wind Body airplanes"

EXPERIENCE

Delft University of Technology 02/2019-present
Assistant Professor, 3D geoinformation group

Carnegie Institution for Science, USA 10/2017-12/2018
Postdoctoral Research Scientist
Focused on fluid dynamic problems applied to large scale wind farms impacts and remediation techniques for hypoxia in aquatic environments

Stanford University, USA 10/2016-09/2017
Visiting student researcher
Performing high fidelity simulations of atmospheric flows in urban environments to evaluate turbulence model uncertainties

Columbia University, USA 10/2015-06/2016
Visiting student researcher
Developed an innovative methodology to determine probability density functions for aleatory uncertainty analysis based on mesoscale models

Columbia University, USA 04/2015-06/2015
Visiting student researcher
Compared uncertainty quantification studies with real scale experiments over Oklahoma City, focused on confidence intervals and variance evaluation

Stanford University, USA 07/2014-09/2014
Visiting student researcher
Applied uncertainty quantification methodologies to study inflow conditions variability effects in dispersion in urban environments

Collaboration at CFD+Engineering, Germany 09/2013-12/2013
Evaluated the performance of coupling mesoscale and ABL flows through the company's code. Adapted the tool for performing simulations over Oklahoma City

Von Karman Institute, Belgium 09/2013-09/2017
Doctoral Researcher

Polytechnic University of Montréal, Canada (PROMOE work placement program) 07/2010-12/2010
Gained experience with diverse Ansys tools: ICEM, CFX, and Workbench

Polytechnic University of Milan, Italy (ERASMUS program) 08/2009-01/2010
Completed three courses within the propulsion specialization of the master degree

Airbus Helicopters, Spain 07/2008-09/2008
Internship

TEACHING EXPERIENCE

Teaching workshop, Stanford University 2018

- Two-day teaching improvement workshop to enhance versatility as teachers, and enable them to use a 7-component education framework to analyse teaching. Topics covered: learning climate, control session, communication of goals, promotion of understanding & retention, evaluation of learners, feedback to learners, promotion of self-directed learning

Supervision of Research Master students at the von Karman Institute 2012-2016

Topics:

- Urban canopy models over Oklahoma City with the Weather Research and Forecasting model
- Large Eddy Simulations of the stratified atmospheric boundary layer
- Uncertainty quantification for atmospheric flows, applied on Askervein Hill real scale case

Courses taught:

- Introduction to OpenFOAM for Research Master students at the von Karman Institute
- Support during the programming course on OpenFOAM, with hands-on practice
- Measurement techniques boundary layer laboratory at the von Karman Institute
- Mesoscale introduction class, CEE 261A, Stanford University

AWARDS

- **Delft Technology Fellowship**, The Netherlands 2018
- PhD grant: **Agency for Innovation by Science and Technology**, Belgium 2013-17
- Von Karman Institute **travel grant** for research stay at Stanford University 2014
- Von Karman Institute award for **Best Collaboration** student 2012
- **NATO fellowship**: research master at the von Karman Institute 2011-12
- 2nd position undergraduate engine design competition, **AIAA** 2011

INVITED & COMMUNITY TALKS

Purdue University, USA March 2016
Seminar on 'Quantifying Inflow Uncertainties for CFD simulations of dispersion in downtown Oklahoma'

Delft University of Technology, The Netherlands March 2018
Seminar on 'Uncertainty Quantification applied to Urban Environments'

Climate Vision group, Palo Alto High School , USA December 2018
Seminar on 'From urban to regional scales in atmospheric flows'

Université Libre de Bruxelles, Belgium January 2019
Seminar on 'From regional to local scales in environmental flows: how computational fluid dynamics can contribute to an efficient use of natural resources'

PUBLICATIONS

Peer reviewed Journal Publications:

1. García-Sánchez, C., Possner, A., Caldeira, K., Wind farm wakes and their implications for wind energy generation (in preparation).
2. Koweek, D.A., García-Sánchez, C., Brodrick, P., Gassett, P., Caldeira, K., Alleviating hypoxia through induced downwelling (submitted).
3. García-Sánchez, C., van Beeck, J., C., Gorlé, C., Predictive Large Eddy Simulations for Urban Flows: Challenges and Opportunities, Building and Environment, 139, 146-156, 2018 (https://doi.org/10.1016/j.buildenv.2018.05.007).
4. Lamberti, G., Gorlé, C., García-Sánchez, C., Sousa, J., Optimizing turbulent inflow conditions for large-eddy simulations of the atmospheric boundary layer, Journal of Wind Engineering and Industrial Aerodynamics, 177, 32-44, 2018 (https://doi.org/10.1016/j.jweia.2018.04.004).

5. García-Sánchez, C., Gorlé, C., Uncertainty quantification for microscale CFD simulations based on input from mesoscale codes, Journal of Wind Engineering and Industrial Aerodynamics, 176, 87-97, 2018 (https://doi.org/10.1016/j.jweia.2018.03.011).
6. Sousa, J., García-Sánchez, C., Gorlé, C., Improving urban flow predictions through data assimilation, Building and Environment, 132, 282-290, 2018 (https://doi.org/10.1016/j.buildenv.2018.01.032).
7. Longo, R., Ferrarotti, M., García-Sánchez, C., Derudi, M., Parente, A. Advanced turbulence models, boundary conditions and dispersion study for flows around different configurations of ground-mounted buildings, Journal of Wind Engineering and Industrial Aerodynamics,167,160-182, 2017 (https://doi.org/10.1016/j.jweia.2017.04.015).
8. García-Sánchez, C., van Tendeloo, G., Gorlé, C., Quantifying inflow uncertainties in RANS simulations of urban pollutant, Atmospheric Environment, 161, 263-273, 2017 (https://doi.org/10.1016/j.atmosenv.2017.04.019).
9. Gorlé, C., García-Sánchez, C., Iaccarino, G., Quantifying turbulence model form and inflow uncertainties in wind engineering flows, Journal of Wind Engineering and Industrial Aerodynamics, 144, 202-212, 2015 (https://doi.org/10.1016/j.jweia.2015.03.025).
10. Ercolani, G., Gorlé, C., García-Sánchez, C., Corbari, C., Mancini, M. RAMS and WRF sensitivity to grid spacing in large-eddy simulations of the dry convective boundary layer, Computers and Fluids, 123, 54-71, 2015 (https://doi.org/10.1016/j.compfluid.2015.09.009).
11. Muñoz-Esparza, D., Kosović, B., García-Sánchez, C., van Beeck, J., Nesting turbulence in an offshore convective boundary layer using large-eddy simulations. Boundary Layer Meteorology, 151, 3, 453-478, 2014 (https://doi.org/10.1007/s10546-014-9911-9).
12. García-Sánchez, C., Philips, D.A., Gorlé, C., Quantifying inflow uncertainties for CFD simulations of the flow in downtown Oklahoma City. Building and Environment, 78, 118-129, 2014 (https://doi.org/10.1016/j.buildenv.2014.04.013).

Conference Publications:

International Conferences, Papers in Proceedings:

1. García-Sánchez, C., Possner, A., Caldeira, K., Analysis of Wind Farm Wakes with the Weather Research and Forecasting model, Computational Wind Engineering Conference, Seoul, June 2018.
2. García-Sánchez, C., Possner, A., Caldeira, K., Analysis of Wind Farm Wakes with the Weather Research and Forecasting model, Computational Wind Engineering Conference, Seoul, June 2018.
3. García-Sánchez, C., Gorlé, C., Inflow uncertainty definition for atmospheric flows in urban and rural environments. 7th European Conference on Wind Engineering Liege, July 2017.
4. Lamberti, G., García-Sánchez, C., Gorlé, C., Large-eddy simulations of the atmospheric boundary layer for calculating wind loads on buildings. 7th European Conference on Wind Engineering Liege, July 2017.
5. Buckingham, S., García-Sánchez, C., Winckelmans, G., Temperature perturbation method to generate turbulent inflow conditions for LES/DNS simulations. 9th International Conference on Computational Fluid Dynamics (ICCFD9), Istanbul, July 2016.
6. García-Sánchez, C., Gorlé, C., van Beeck, J., Influence of inflow parameter uncertainty in CFD simulations of urban environments. 8th International Colloquium on Bluff Body Aerodynamics and Applications, Boston, June 2016.
7. García-Sánchez, C., Gorlé, C., van Beeck, J., Iaccarino, G. Inflow Uncertainty Quantification of dispersion in Oklahoma City. 14th International Conference on Wind Engineering, Porto Alegre (Brazil) 21-25 June 2015.
8. García-Sánchez, J. van Beeck, C., Gorlé, C., Inflow uncertainty quantification within urban environments: wind fields and dispersion patterns. WINERCOST Workshop 'Trends and Challenges for Wind Energy Harvesting', Coimbra (Portugal) 30-31 March 2015.
9. García-Sánchez, Parente, A., Fisher, A., van Beeck, J., Gorlé, C., Extracting RANS CFD inflow boundary conditions from mesoscale model for simulations of the Joint Urban 2003 experiment. 6th International Symposium in Computational Wind Engineering, Hamburg, June, 2014.

10. Philips, D. A., García-Sánchez, C., Iaccarino, G., Quantifying Inflow Uncertainty in RANS Simulations of Joint Urban 2003, 6th European-African Conference for Wind Engineering, Cambridge, 2013.

International Conferences, Abstracts in Proceedings and Posters:

1. García-Sánchez, C., Possner, A., Caldeira, K., The scaling of wind farm shadows and their consequences for energy generation, European Geosciences Union, Vienna, April 2019.
2. García-Sánchez, C., Gorlé, C., On the use of the Weather Research and Forecasting model to define inflow uncertainty for atmospheric boundary layer simulations, 13th Americas Conference on Wind Engineering, Gainesville, May 2017.
3. García-Sánchez, C., Gorlé, C., Quantifying inflow uncertainties in RANS simulations of urban pollutant, TFSA 2017, Stanford University, February 2016.
4. García-Sánchez, C., Gorlé, C., Uncertainty Quantification for wind flows: natural terrain and urban area applications. 69th Annual Meeting of the APS Division of Fluid Dynamics, Portland, 2016.
5. García-Sánchez, C., Gorlé, C., Quantifying Uncertainty in the Prediction of Pollutant Dispersion, SIAM conference on Uncertainty Quantification, Lausanne, April, 2016.
6. García-Sánchez, C., Invited Seminar at Purdue University, March 2016: Quantifying Inflow Uncertainties for CFD simulations of dispersion in downtown Oklahoma.
7. Jornadas UPV 2016: 10 años de ingeniería aeronáutica en la upv: una vista atrás.
8. García-Sánchez, C., Gorlé, C., van Beeck, J., Defining boundary conditions for RANS predictions of urban flows using mesoscale simulations. 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, 2015.
9. García-Sánchez, C., Gorlé, C., Iaccarino, G., Uncertainty Quantification of RANS dispersion modelling in Oklahoma City during the Joint Urban 2003 campaign. 67th Annual Meeting of the APS Division of Fluid Dynamics, San Francisco, 2014.
10. Gorlé, C., García-Sánchez, C., Philips, D. A., Iaccarino, G., Quantifying the effect of Inflow Variability in RANS Simulations of the JU2003 experiment, 66th Annual Meeting of the APS Division of Fluid Dynamics, Pennsylvania, 2013.
11. Muñoz-Esparza, D., García-Sánchez, C, Canadillas, B., van Beeck, J. Multiscale Large Eddy Simulations of a convective offshore boundary layer: towards a mesoscale-LES coupling. 20th Symposium on Boundary Layer Turbulence, Boston, 2012.

SERVICES

Reviewer

- Wind Engineering and Industrial Aerodynamics
- Building and Environment
- Atmospheric Environment
- Environmental Fluid Mechanics
- Advances in Atmospheric Sciences
- Atmospheric Research
- Building Simulation

Membership

- Von Karman Institute Alumni

RESEARCH/TEACHING INTERESTS

- Fluid mechanics
- Environmental flows at city and regional scales
- Optimization strategies to alleviate pollution in populated urban areas
- Renewable energy and air quality
- Uncertainty quantification methodologies

SKILLS

- Computation fluid dynamics: OpenFOAM, WRF, Fluent, CFX
- Mesh generation: snappyHexMesh, ICEM, Gambit
- Uncertainty quantification: dakota

- Programming experience: matlab, bash, OpenFOAM, python
- Languages: Spanish (mother tongue), English and French (fluent), Italian and Portuguese (basic)