RESEARCH PORTFOLIO

- My record of dissemination includes dozens of peer-reviewed scientific journal articles, technical reports, book chapters and extensive conference papers and podium presentations.
- I serve as an Associate Editor for the *Journal of Renewable and Sustainable Energy*, where I work to curate high-impact publications on pressing topics in wind energy, wake dynamics, and experimentation.
- In the past few years I have served extensively as a peer reviewer for for scientific publications including: *Wind Energy*, *Wind Energy Science*, *Journal of Fluid Mechanics*, *Physics of Fluids*, *Physical Review - Fluids*, *Journal of Renewable and Sustainable Energy*, and *Energies*.

Publication Metrics

Citations: **750+** | $h-$index: **18** | $i10-$index: **22**

Journal Articles

- Hulsman, P., Martınez-Tossas, L. A., **Hamilton, N.**, Kühn, M., "Implementation of a Near-Wake Region within the Curled-Wake Model". *Wind Energy Science Discussions*, vol. 2023, 2023, pp. 1–26.
- Letizia, S., Brugger, P., Bodini, N., Krishnamurthy, R., Scholbrock, A., Simley, E., Porté-Agel, F., **Hamilton, N.**, Doubrawa, P., Moriarty, P., "Characterization of wind turbine flow through nacelle-mounted lidars: a review". *Frontiers in Mechanical Engineering*, vol. 9, no. PNNL-SA-179377, 2023.
- Rybchuk, A., Hassanaly, M., **Hamilton, N.**, Doubrawa, P., Fulton, M. J., Martınez-Tossas, L. A., "Ensemble flow reconstruction in the atmospheric boundary layer from spatially limited measurements through latent diffusion models". *Physics of Fluids*, vol. 35, no. 12, 2023.
- Rybchuk, A., Hassanaly, M., **Hamilton, N.**, Doubrawa, P., Fulton, M. J., Martınez-Tossas, L. A., "Generating Initial Conditions for Ensemble Data Assimilation of Large-Eddy Simulations with Latent Diffusion Models". *arXiv preprint arXiv:2303.00836*, 2023.
- Sadek, Z., Scott, R., **Hamilton, N.**, Cal, R. B., "A three-dimensional, analytical wind turbine wake model: Flow acceleration, empirical correlations, and continuity". *Renewable Energy*, vol. 209, 2023, pp. 298–309.
- Scott, R., Martínez-Tossas, L., Bossuyt, J., **Hamilton, N.**, Cal, R. B., "Evolution of Eddy Viscosity in the wake of a wind turbine". *Wind Energy Science*, 2023.
- Bastankhah, M., **Hamilton, N.**, Cal, R. B., "Wind tunnel research, dynamics, and scaling for wind energy". *Journal of Renewable and Sustainable Energy*, vol. 14, no. 6, 2022, p. 060402.
- **Hamilton, N.**, Gayme, D., Cal, R. B., "Wind plant controls". *Journal of Renewable and Sustainable Energy*, vol. 14, no. 6, 2022, p. 060401.
- Scott, R., Martınez-Tossas, L., **Hamilton, N.**, Cal, R. B., "Evolution of Eddy Viscosity in the Wake of a Wind Turbine". *Wind Energy Science Discussions*, 2022, pp. 1–22.
- Farrell, A., King, J., Draxl, C., Mudafort, R., **Hamilton, N.**, Bay, C. J., Fleming, P., Simley, E., "Design and analysis of a wake model for spatially heterogeneous flow". *Wind Energy Science*, vol. 6, no. 3, 2021, pp. 737–758.
- Martınez-Tossas, L. A., King, J., Quon, E., Bay, C. J., Mudafort, R., **Hamilton, N.**, Howland, M. F., Fleming, P. A., "The curled wake model: a three-dimensional and extremely fast steady-state wake solver for wind plant flows". *Wind Energy Science*, vol. 6, no. 2, 2021, pp. 555–570.
- Doubrawa, P., Quon, E. W., Martinez-Tossas, L. A., Shaler, K., Debnath, M., **Hamilton, N.**, Herges, T. G., Maniaci, D., Kelley, C. L., Hsieh, A. S., "Multimodel validation of single wakes in neutral and stratified atmospheric conditions". *Wind Energy*, vol. 23, no. 11, 2020, pp. 2027–2055.
- Farrell, A., King, J., Draxl, C., Mudafort, R., **Hamilton, N.**, Bay, C. J., Fleming, P., Simley, E., "Design and analysis of a spatially heterogeneous wake". *Wind Energy Science Discussions*, vol. 2020, 2020, pp. 1–25.
- **Hamilton, N.** "Atmospheric condition identification in multivariate data through a metric for total variation". *Atmospheric Measurement Techniques*, vol. 13, no. 2, 2020, pp. 1019–1032.
- **Hamilton, N.**, Bay, C. J., Fleming, P., King, J., Martınez-Tossas, L. A., "Comparison of modular analytical

wake models to the Lillgrund wind plant". *Journal of Renewable and Sustainable Energy*, vol. 12, no. 5, 2020, p. 053311.

- Martınez-Tossas, L. A., King, J., Quon, E., Bay, C. J., Mudafort, R., **Hamilton, N.**, Fleming, P., "The curled wake model: A three-dimensional and extremely fast steady-state wake solver for wind plant flows". *Wind Energy Science Discussions*, vol. 2020, 2020, pp. 1–16.
- Ali, N., **Hamilton, N.**, Calaf, M., Cal, R. B., "Classification of the Reynolds stress anisotropy tensor in very large thermally stratified wind farms using colormap image segmentation". *Journal of Renewable and Sustainable Energy*, vol. 11, no. 6, 2019, p. 063305.
- Ali, N., **Hamilton, N.**, Calaf, M., Cal, R. B., "Turbulence kinetic energy budget and conditional sampling of momentum, scalar, and intermittency fluxes in thermally stratified wind farms". *Journal of Turbulence*, vol. 20, no. 1, 2019, pp. 32–63.
- **Hamilton, N.** "Total variation of atmospheric data: covariance minimization about objective functions to detect conditions of interest". *Atmospheric Measurement Techniques*, 2019.
- Quon, E. W., Doubrawa, P., Annoni, J., **Hamilton, N.**, Churchfield, M. J., *AIAA Scitech 2019 Forum*. 2019, p. 2085.
- Ali, N., **Hamilton, N.**, Cortina, G., Calaf, M., Cal, R. B., "Anisotropy stress invariants of thermally stratified wind turbine array boundary layers using large eddy simulations". *Journal of Renewable and Sustainable Energy*, vol. 10, no. 1, 2018, p. 013301.
- Ali, N., **Hamilton, N.**, DeLucia, D., Bayoán Cal, R., "Assessing spacing impact on coherent features in a wind turbine array boundary layer". *Wind Energy Science*, vol. 3, no. 1, 2018, pp. 43–56.
- **Hamilton, N.**, Viggiano, B., Calaf, M., Tutkun, M., Cal, R. B., "A generalized framework for reduced-order modeling of a wind turbine wake". *Wind Energy*, vol. 21, no. 6, 2018, pp. 373–390.
- Ali, N., Cortina, G., **Hamilton, N.**, Calaf, M., Cal, R., "Turbulence characteristics of a thermally stratified wind turbine array boundary layer via proper orthogonal decomposition". *Journal of Fluid Mechanics*, vol. 828, 2017, pp. 175–195.
- **Hamilton, N.**, Tutkun, M., Cal, R. B., "Anisotropic character of low-order turbulent flow descriptions through the proper orthogonal decomposition". *Physical Review Fluids*, vol. 2, no. 1, 2017, p. 014601.
- **Hamilton, N.**, Tutkun, M., Cal, R. B., "Low-order dynamical system model of a fully developed turbulent channel flow". *Physics of Fluids*, vol. 29, no. 6, 2017, p. 065107.
- Ali, N., **Hamilton, N.**, Cal, R. B., "Assessing Spacing Impact on the Wind Turbine Array Boundary Layer via Proper Orthogonal Decomposition". *Wind Energy Science Discussions*, 2016, pp. 1–21.
- **Hamilton, N.**, Tutkun, M., Cal, R. B., "Low-order representations of the canonical wind turbine array boundary layer via double proper orthogonal decomposition". *Physics of Fluids*, vol. 28, no. 2, 2016, p. 025103.
- **Hamilton, N.**, Cal, R. B., "Anisotropy of the Reynolds stress tensor in the wakes of wind turbine arrays in Cartesian arrangements with counter-rotating rotors". *Physics of Fluids*, vol. 27, no. 1, 2015, p. 015102.
- **Hamilton, N.**, Melius, M., Cal, R. B., "Wind turbine boundary layer arrays for Cartesian and staggered configurations-Part I, flow field and power measurements". *Wind Energy*, vol. 18, no. 2, 2015, pp. 277–295.
- Vested, M., **Hamilton, N.**, Sørensen, J., Cal, R., "More efficient wind farms by the use of different height wind turbines". 2014.
- **Hamilton, N.**, Suk Kang, H., Meneveau, C., Bayoán Cal, R., "Statistical analysis of kinetic energy entrainment in a model wind turbine array boundary layer". *Journal of renewable and sustainable energy*, vol. 4, no. 6, 2012, p. 063105.

Technical Reports

- Doubrawa, P., Kelley, C., Naughton, J., **Hamilton, N.**, Ivanov, H., Letizia, S., Maric, E., Scholbrock, A., Brown, K., Herges, T., RAAW.. 2023.
- **Hamilton, N.**, Maric, E., Acoustic Travel-Time Tomography for Wind Energy. 2022.

- Bortolotti, P., Guo, Y., Simley, E., Roadman, J., **Hamilton, N.**, Moriarty, P. J., Sucameli, C. R., Bertagnolio, F., Validation Efforts of an Open-Source Aeroacoustics Model for Wind Turbines. 2021.
- **Hamilton, N.**, Bortolotti, P. E., Jager, D., Guo, Y., Roadman, J. M., Simley, E., Aeroacoustic Assessment of Wind Plant Controls. 2021.
- Herges, T., Debnath, M., Fao, R., **Hamilton, N.**, Krishnamurthy, R., Maniaci, D. C., Naughton, J., AWAKEN Instrumentation Development Roadmap. 2020.
- Moriarty, P., **Hamilton, N.**, Debnath, M., Herges, T., Isom, B., Lundquist, J. K., Maniaci, D., Naughton, B., Pauly, R., Roadman, J., American WAKe ExperimeNt (AWAKEN).. 2020.
- **Hamilton, N.**, Debnath, M. C., National Wind Technology Center-Characterization of Atmospheric Conditions. 2019.
- Shaler, K., Jonkman, J., Doubrawa Moreira, P., **Hamilton, N.,** FAST. Farm response to varying wind inflow techniques. 2019.

Book Chapters

- **Hamilton, N. M.**, Tutkun, M., Cal, R. B., "Turbulent and Deterministic Stresses in the Near Wake of a Wind Turbine Array". *Whither Turbulence and Big Data in the 21st Century?*, Springer, Cham, 2017, pp. 255–271.

Conference Proceedings

- Abraham, A., Letizia, S., Bodini, N., **Hamilton, N.,** "Investigation of wind plant wake effects at the AWAKEN field campaign". "Investigation of wind plant wake effects at the AWAKEN field campaign". American Physical Society, 2023.
- Cheung, L., Hsieh, A., Blaylock, M., Herges, T., deVelder, N., Brown, K., Sakievich, P., Houck, D., Maniaci, D., Kaul, C., "Investigations of Farm-to-Farm Interactions and Blockage Effects from AWAKEN Using Large-Scale Numerical Simulations". *Journal of Physics: Conference Series*, IOP Publishing, 2023, p. 012023.
- Letizia, S., Bodini, N., Scholbrock, A., **Hamilton, N.**, Doubrawa, P., "Holistic Scan Optimization of Nacelle-Mounted Lidars for the Rotor Aerodynamics Aeroelastics and Wake (RAAW) Experiment". *103rd AMS Annual Meeting*, AMS,. 2023.
- Maric, E., **Hamilton, N.,** "Acoustic Travel-Time Tomography for Wind Energy". *103rd AMS Annual Meeting*, AMS,. 2023.
- Maric, E., **Hamilton, N.,** "Three-Dimensional Acoustic Travel-Time Tomography for Wind Energy". "Three-Dimensional Acoustic Travel-Time Tomography for Wind Energy". American Physical Society, 2023.
- Moriarty, P., Bodini, N., **Hamilton, N.**, Herges, T. G., Iungo, G. V., Ivanov, H., Kaul, C., Krishnamurthy, R., Letizia, S., Lundquist, J. K., "Overview of the American Wake Experiment (AWAKEN)".. *103rd AMS Annual Meeting*, AMS,. 2023.
- Rybchuk, A., Martınez-Tossas, L., **Hamilton, N.**, Doubrawa, P., Vijayakumar, G., Hassanaly, M., Kuhn, M., Zalkind, D., "A baseline for ensemble-based, time-resolved inflow reconstruction for a single turbine using large-eddy simulations and latent diffusion models". *Journal of Physics: Conference Series*, IOP Publishing, 2023, p. 012018.
- Rybchuk, A., Hassanaly, M., Martınez-Tossas, L. A., **Hamilton, N.**, Fulton, M. J., Doubrawa, P., "Reconstructing Atmospheric Initial Conditions from Synthetic Field Measurements for Turbine Model Validation through Denoising Diffusion Probabilistic Models". *103rd AMS Annual Meeting*, AMS,. 2023.
- Debnath, M., Scholbrock, A. K., Zalkind, D., Moriarty, P., Simley, E., **Hamilton, N.**, Ivanov, C., Arthur, R. S., Barthelmie, R., Bodini, N., "Design of the American Wake Experiment (AWAKEN) field campaign". *Journal of Physics: Conference Series*, IOP Publishing, 2022, p. 022058.
- **Hamilton, N.**, Doubrawa, P., Naughton, J., Kelley, C., "Rotor Aerodynamics, Aeroelastics, and Wake (RAAW) Campaign Overview". "Rotor Aerodynamics, Aeroelastics, and Wake (RAAW) Campaign Overview". American Physical Society, 2022.
- Scott, R., **Hamilton, N.**, Cal, R., "Characterizing Spatially Heterogeneous Wind Turbine Wakes Under Yaw and Tilt Misalignment". "Characterizing Spatially Heterogeneous Wind Turbine Wakes Under Yaw and Tilt Misalignment". American Physical Society, 2022.

- **Hamilton, N.**, Doubrawa, P., Debnath, M., Brugger, P., Porté-Agel, F., "A Modal Description of Dynamic Wake Meandering". *APS Division of Fluid Dynamics Meeting Abstracts*, 2021, E15–006.
- Sadek, Z., Cal, R. B., **Hamilton, N.,** "Mass Consistent, Analytical Near Wake Models for Wind Turbines". *APS Division of Fluid Dynamics Meeting Abstracts*, 2021, H15–003.
- Scott, R., Martinez-Tossas, L., **Hamilton, N.**, Cal, R. B., "Downstream Evolution of Eddy Viscosity in the Wake of a Wind Turbine". *APS Division of Fluid Dynamics Meeting Abstracts*, 2021, E22–009.
- Debnath, M., Brugger, P., Simley, E., Doubrawa, P., **Hamilton, N.**, Scholbrock, A., Jager, D., Murphy, M., Roadman, J., Lundquist, J. K., "Longitudinal coherence and short-term wind speed prediction based on a nacelle-mounted Doppler lidar". *Journal of Physics: Conference Series*, IOP Publishing, 2020, p. 032051.
- Fleming, P., King, J., Bay, C. J., Simley, E., Mudafort, R., **Hamilton, N.**, Farrell, A., Martinez-Tossas, L., "Overview of FLORIS updates". *Journal of Physics: Conference Series*, IOP Publishing, 2020, p. 022028.
- **Hamilton, N.** "Highlighting the impact of yaw control by parsing atmospheric conditions based on total variation". *Journal of Physics: Conference Series*, IOP Publishing, 2020, p. 012006.
- Hulsman, P., Martınez-Tossas, L. A., **Hamilton, N.**, Kühn, M., "Modelling and assessing the near-wake representation and turbulence behaviour of control-oriented wake models". *Journal of Physics: Conference Series*, IOP Publishing, 2020, p. 022056.
- Sadek, Z., Cal, R. B., **Hamilton, N.,** "A new analytical wavelet-Gaussian wake model". *APS Division of Fluid Dynamics Meeting Abstracts*, 2020, G03–005.
- **Hamilton, N.** "Identification of Dynamic Atmospheric Conditions via Total Variation". *APS Division of Fluid Dynamics Meeting Abstracts*, 2019, P20–008.
- Shaler, K., Jonkman, J., **Hamilton, N.,** "Effects of inflow spatiotemporal discretization on wake meandering and turbine structural response using FAST. Farm". *Journal of Physics: Conference Series*, IOP Publishing, 2019, p. 012023.
- Ali, N., **Hamilton, N.**, Calaf, M., Cal, R., "Computer Aided Image Segmentation and Classification of the Reynolds Stress Anisotropy Tensor". "Computer Aided Image Segmentation and Classification of the Reynolds Stress Anisotropy Tensor". American Physical Society, 2018.
- Debnath, M., **Hamilton, N.**, Moriarty, P., "Development of coherent structures in complex terrain". "Development of coherent structures in complex terrain". American Physical Society, 2018.
- **Hamilton, N.**, Hansen, J., Lundquist, J., Moriarty, P., Ostashev, V., "Acoustic tomography of turbulent flows near wind turbines". "Acoustic tomography of turbulent flows near wind turbines". American Physical Society, 2018.
- Jonkman, J., Doubrawa, P., **Hamilton, N.**, Annoni, J., Fleming, P., "Validation of fast. farm against large-eddy simulations". *Journal of Physics: Conference Series*, IOP Publishing, 2018, p. 062005.
- **Hamilton, N.**, Viggiano, B., Calaf, M., Tutkun, M., Cal, R. B., "Towards a Wind Turbine Wake Reduced-Order Model". *APS Division of Fluid Dynamics Meeting Abstracts*, 2017, A27–002.
- Ali, N., Cortina, G., **Hamilton, N.**, Calaf, M., Cal, R., "Proper orthogonal decomposition of a large eddy simulation during a diurnal cycle for very large wind farms". *APS Division of Fluid Dynamics Meeting Abstracts*, 2016, pp. D2–007.
- Cal, R., Ali, N., **Hamilton, N.**, Cortina, G., Calaf, M., "Anisotropy stress invariants of a large eddy simulation during a diurnal cycle for very large wind farms". *APS Division of Fluid Dynamics Meeting Abstracts*, 2016, pp. D2–008.
- **Hamilton, N.**, Tutkun, M., Cal, R. B., "Anisotropic character of low-order turbulent flow descriptions with the proper orthogonal decomposition". *APS Division of Fluid Dynamics Meeting Abstracts*, 2016, G35–001.
- **Hamilton, N.**, Tutkun, M., Cal, R. B., "Low-order representations of a wind turbine array boundary layer via double POD".. *APS Division of Fluid Dynamics Meeting Abstracts*, 2015, pp. L12–005.
- Cal, R. B., Ramos, A., **Hamilton, N.**, Houck, D., "Spacing dependence on wind turbine array boundary layers". *APS Division of Fluid Dynamics Meeting Abstracts*, 2014.

- Cal, R. B., **Hamilton, N.**, “Development of a wind turbine wake in the infinite turbine array characterized via wall-normal-spanwise planes and cylindrical coordinates”. *APS Division of Fluid Dynamics Meeting Abstracts*, 2014, R26–007.
- **Hamilton, N.**, Tutkun, M., Cal, R. B., “Characterization of Reynolds and deterministic stresses through phase-dependent measurements in the near wake of a wind turbine in an infinite turbine array”. *APS Division of Fluid Dynamics Meeting Abstracts*, 2014, R26–008.
- **Hamilton, N.**, Cal, R., “Characteristic shapes of the normalized Reynolds stress anisotropy tensor in the wakes of wind turbines with counter-rotating rotors”. *17th international symposium on applications of laser techniques to fluid mechanics*, 2014, pp. 1–18.
- **Hamilton, N.**, Cal, R., “Statistical development of wind turbine wakes for the fully developed wind turbine array boundary layer characterized via wall-normal-spanwise planes”. *19th Australasian Fluid Mechanics Conference*, 2014.
- Vested, M. H., **Hamilton, N.**, Sørensen, J. N., Cal, R. B., “Wake interaction and power production of variable height model wind farms”. *Journal of Physics: Conference Series*, IOP Publishing, 2014, p. 012169.
- Cal, R., Melius, M., **Hamilton, N.**, Houck, D., “Experimental study of turbine hub height variation on wind farms”. *51st AIAA Aerospace Sciences Meeting including the New Horizons Forum and Aerospace Exposition*, 2013, p. 609.
- **Hamilton, N.**, Cal, R. B., “Anisotropy tensor invariant assessment for counter-rotating wind turbine wakes”. *APS Division of Fluid Dynamics Meeting Abstracts*, 2013, H22–005.
- Ramos, A., **Hamilton, N.**, DeLucia, D., Cal, R. B., “Influence of Spatial Variations on the Flow Field and Power Production of a Model Wind Farm”. *APS Division of Fluid Dynamics Meeting Abstracts*, 2013, R28–001.
- Cal, R. B., **Hamilton, N.**, Kang, H.-S., Meneveau, C., “Statistical analysis of kinetic energy entrainment in a model wind turbine array boundary layer”. *APS Division of Fluid Dynamics Meeting Abstracts*, 2012, R31–002.
- **Hamilton, N.**, Tutkun, M., Cal, R. B., “Low dimensional model of energy reconstruction for inline and offset wind turbine arrays”. *APS Division of Fluid Dynamics Meeting Abstracts*, 2012, R31–007.
- Delucia, D., **Hamilton, N.**, Bayoán Cal, R., “Power measurements on a stratified 3$\times$ 3 wind turbine array”. *APS Division of Fluid Dynamics Meeting Abstracts*, 2011, pp. D27–003.
- **Hamilton, N.**, Bayoan Cal, R., “Visualizing the effects due to a wind turbine in a stratified turbulent boundary layer”. *APS Division of Fluid Dynamics Meeting Abstracts*, 2010, GG–009.