

Bjørn Winther Solemslie



Work:

Department of Aquatic biodiversity
Norwegian Institute for Nature Research
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Current Position

Norwegian Institute for Nature Research
Research Scientist

Trondheim, Norway
2021–Present

Work Experience

Norwegian University of Science and Technology
Adjunct Associate Professor (20%)

Trondheim, Norway
2022–2024

Norwegian University of Science and Technology
Postdoctoral Fellow

Trondheim, Norway
2020

Norwegian University of Science and Technology
Associate Professor

Trondheim, Norway
2020

Norwegian University of Science and Technology
Postdoctoral Fellow

Trondheim, Norway
2016–2019

Norwegian University of Science and Technology
Scientific Assistant

Trondheim, Norway
2010–2011

Education

Norwegian University of Science and Technology
Ph.D., Mechanical Engineering
Thesis Title: Experimental Methods and Design of a Pelton Bucket
Supervisors: Ole G. Dahlhaug and Torbjørn K. Nielsen

2011–2016

M.Sc., Mechanical Engineering
Thesis Title: Optimisation of Pelton Distributor
Supervisor: Torbjørn K. Nielsen

2004–2010

Research and Teaching Interests

Renewable Energy	System Dynamics	Fish Passages
Experimental Methods	Eco Hydraulics	Digitalization
High Speed Visualisation	Condition monitoring	Image Processing
Instrumentation	Data Analysis	Uncertainty
Resonance	Fatigue	Damping

Awards

2014 Best Student Paper at the 27th IAHR Symposium on Hydraulic Machinery and Systems, Montreal, Canada

Research Experience

FishPath Project (NFR#320700)

Researcher 2021–Present

Turbulent eddies to create paths for safe downstream migration for salmonids and eel past hydropower intakes

- Development of a new PIV test rig at the Waterpower Laboratory (NTNU) to enable measurements of flow field downstream leading elements.
- Development of structures to produce fish repelling or attracting eddies in order to lead fish away from the intake of hydro power plants

DeGas Project (NFR#308747)

WP-Leader 2020–Present

A new technical solution for preventing environmental effects of air supersaturation downstream hydropower plants

- Leader of WP1 - New technical solution for using ultrasound and aeration to reduce gas supersaturation inside the hydropower plant
- Assist PhD candidate in experimental design, execution and processing of experimental campaigns
- Develop empirical model of ultrasonic degassing of flowing water

TYDE_Science Project (NFR#336961)

Researcher 2023–Present

Development of digital tools for increased production of run-of-river hydro power production by improved operation and maintenance planning.

- Develop tools to increase the production of run-of-river hydro power plants by improving the operation and maintenance planning.
- Specifically through monitoring of the condition of key components and the establishment of a economical and satisfactory method for both flow measurements through the turbine and flow estimation over the dam.

- Results aims to ensure that less water is lost over the dam, while still keeping with the required environmental flow in the natural bypass.

eDNA Sampler project (HydroCen 5.4.12)

Project Manager

2020–2024

Hardware and software development of a low cost, modular and automatic eDNA-sampler for long time field deployment

- Develop a system able to filter large volumes of water and store for later eDNA-analysis.
- Identify appropriate components and integrate them in the system designed in the project
- Develop the software to automatically operate the system on a user defined schedule including wireless status communication back to a centralized system

PeltonProto project (HydroCen 5.2.6)

Project Manager

2020–2024

Project to improve measurements of prototype efficiency on Pelton turbines in Norway

- Investigate influence of common issues due to the specific layout of a common Norwegian hydro power plant with Pelton turbines
- Develop new method for measuring bubble content in flowing water
- Develop new best practice for measuring prototype efficiency when the IEC standard is not possible to follow

Norwegian University of Science and Technology

Postdoctoral fellow; Advisor: Ole G. Dahlhaug

2016–2020

Fatigue, damping and natural frequency in High Head Francis Turbines

- Deputy project manager and head of experimental work
- Participation in the development of experiments, post processing methods and analysis of damping measurements on a linear, single and triple blade cascade
- Participation in the development of experiments, post processing methods and analysis of onboard, flush mounted, pressure measurements in a high head Francis model runner

Norwegian University of Science and Technology

PhD candidate; Supervisor: Ole G. Dahlhaug and Tobjørn K. Nielsen

2011–2016

Experimental methods and design of a Pelton bucket

- Development of design methodology for a Pelton bucket
- Development of experiments for studying the flow within a Pelton bucket during operation utilising high speed visualisation
- Post processing method development for extracting flow development within a Pelton bucket and establish method for evaluation of uncertainty in the results

Norwegian University of Science and Technology

Scientific assistant

2010–2011

Supporting master students and PhD Candidates with their experimental research.
Contributing to measurements and analysis of an efficiency test of a Pelton turbine for the Norwegian turbine producer DynaVec.

Norwegian University of Science and Technology

Research assistant Summer 2010
Contributed in establishing and visualising the nacelle of the reference 10MW offshore wind turbine introduced in the NOWITECH research centre

Norwegian University of Science and Technology

M.Sc. thesis 2010
Efficiency measurements and hydraulic optimisation of the distributor of a 5-jet Pelton turbine for the Norwegian turbine manufacturer HydroEnergi

Norwegian University of Science and Technology

Research Assistant Summer 2009
Working with PhD Candidate Jose Luis Plasencia on experimental study of oil-water flows, at the Multiphase Flow Laboratory

University Centre in Svalbard

Student Spring 2008
Responsible for designing and conducting experiments to study sea ice permeability during two week scientific cruise in the Barents sea.

University Centre in Svalbard

Student Spring 2008
Assistant for PhD candidate investigating the composition of pack ice ridges during two week scientific cruise in the Barents sea.

Appointments

2016–Present	Instrumentation expert in advisory group, EnergizeNepal Project	
2012–2015	Representative for PhD Candidate, Faculty PhD Committee	
2010–2011	Scientific Assistant, Waterpower Laboratory, Department of Energy and Process Engineering, Norwegian University of Science and Technology	

Supervision of PhD Candidates

2025–present	Jan-Karl Lasse Escher	Norwegian University of Science and Technology
2021–present	Jim Abregu	Norwegian University of Science and Technology
2020–2024	Wolf Ludwig Kuhn	Norwegian University of Science and Technology
2022–2024	Johannes Opedal Kverno	Norwegian University of Science and Technology

Supervision of Master Students

Supervision of over 50 Master students at The Waterpower Laboratory, NTNU and the Turbine Testing Lab, Kathmandu University.

Publications

Journal articles

Solemslie, B. W. and Dahlhaug, O. G. “Studying the Effects of Jet Alignment in Pelton Units”. In: *International Journal on Hydropower & Dams* 22.3 (2015), pp. 78–83

Solemslie, B. W. and Dahlhaug, O. G. “A Reference Pelton Turbine—Three-Dimensional Flow Front Tracking Within a Rotating Pelton Bucket”. In: *Journal of Fluids Engineering* 140.12 (2018), p. 121104. ISSN: 0098-2202. DOI: [10.1115/1.4040444](https://doi.org/10.1115/1.4040444)

Agnalt, E., Østby, P., **Solemslie, B. W.**, and Dahlhaug, O. G. “Experimental Study of a Low-Specific Speed Francis Model Runner during Resonance”. In: *Shock and Vibration* 2018 (2018), pp. 1–12. ISSN: 1070-9622, 1875-9203. DOI: [10.1155/2018/5796875](https://doi.org/10.1155/2018/5796875)

Bergan, C. W., **Solemslie, B. W.**, Østby, P., and Dahlhaug, O. G. “Hydrodynamic Damping of a Fluttering Hydrofoil in High-speed Flows”. In: *International Journal of Fluid Machinery and Systems* 11.2 (2018), pp. 146–153. ISSN: 1882-9554. DOI: [10.5293/IJFMS.2018.11.2.146](https://doi.org/10.5293/IJFMS.2018.11.2.146)

Agnalt, E., Iliev, I., **Solemslie, B. W.**, and Dahlhaug, O. G. “On the Rotor Stator Interaction Effects of Low Specific Speed Francis Turbines”. In: *International Journal of Rotating Machinery* 2019 (2019), pp. 1–11. ISSN: 1023-621X, 1542-3034. DOI: [10.1155/2019/5375149](https://doi.org/10.1155/2019/5375149)

Volent, E., Sagmo, K., **Solemslie, B. W.**, and Dahlhaug, O. G. “Experimental Study of Flow Structure in Converging–Diverging Axisymmetric Geometry”. In: *Journal of Fluids Engineering* 142.4 (2020). ISSN: 0098-2202, 1528-901X. DOI: [10.1115/1.4045853](https://doi.org/10.1115/1.4045853)

Agnalt, E., **Solemslie, B. W.**, Storli, P.-T. S., and Dahlhaug, O. G. “The Rotor-Stator Interaction Onboard a Low Specific Speed Francis Turbine”. In: *International Journal of Fluid Machinery and Systems* 13.2 (2020), pp. 302–309

Chitrakar, S., **Solemslie, B. W.**, Neopane, H. P., and Dahlhaug, O. G. “Review on Numerical Techniques Applied in Impulse Hydro Turbines”. In: *Renewable Energy* 159 (Oct. 2020), pp. 843–859. ISSN: 09601481. DOI: [10.1016/j.renene.2020.06.058](https://doi.org/10.1016/j.renene.2020.06.058)

Conference Papers

Solemslie, B. W. and Dahlhaug, O. G. “A Reference Pelton Turbine Design”. In: *IOP Conference Series: Earth and Environmental Science* 15.3 (2012), p. 032005. ISSN: 1755-1307, 1755-1315. DOI: [10.1088/1755-1315/15/3/032005](https://doi.org/10.1088/1755-1315/15/3/032005)

Solemslie, B. W. and Dahlhaug, O. G. “A Reference Pelton Turbine-Design and Efficiency Measurements”. In: *IOP Conference Series: Earth and Environmental Science* 22.1 (2014), p. 012004

Solemslie, B. W. and Dahlhaug, O. G. “A Reference Pelton Turbine - High Speed Visualization in the Rotating Frame”. In: *IOP Conference Series: Earth and Environmental Science* 49.2 (2016), p. 022002. ISSN: 1755-1307, 1755-1315. DOI: [10.1088/1755-1315/49/2/022002](https://doi.org/10.1088/1755-1315/49/2/022002)

Solemslie, B. W., Trivedi, C., Agnalt, E., and Dahlhaug, O. G. “Pressure Pulsations and Fatigue Loads in High Head Francis Turbines”. In: *IOP Conference Series: Earth*

and Environmental Science 240 (2019), p. 022039. ISSN: 1755-1315. DOI: [10.1088/1755-1315/240/2/022039](https://doi.org/10.1088/1755-1315/240/2/022039)

Bergan, C. W., Tengs, E. O., **Solemslie, B. W.**, and Dahlhaug, O. G. “An Experimental Investigation of the Hydrodynamic Damping of Vibrating Hydrofoils”. In: *IOP Conference Series: Earth and Environmental Science* 240 (2019), p. 062008. ISSN: 1755-1315. DOI: [10.1088/1755-1315/240/6/062008](https://doi.org/10.1088/1755-1315/240/6/062008)

Agnalt, E., **Solemslie, B. W.**, and Dahlhaug, O. G. “Onboard Measurements of Pressure Pulsations in a Low Specific Speed Francis Model Runner”. In: *IOP Conference Series: Earth and Environmental Science* 240 (2019), p. 022040. ISSN: 1755-1315. DOI: [10.1088/1755-1315/240/2/022040](https://doi.org/10.1088/1755-1315/240/2/022040)

Bergan, C. W., Tengs, E. O., **Solemslie, B. W.**, Østby, P., and Dahlhaug, O. G. “Damping Measurements on a Multi-Blade Cascade with Multiple Degrees of Freedom”. In: *IOP Conference Series: Earth and Environmental Science* (2019)

Rognerud, M. E., **Solemslie, B. W.**, Islam, H., and Pollet, B. G. “How to Avoid Total Dissolved Gas Supersaturation in Water from Hydropower Plants by Employing Ultrasound”. In: *J. Phys.: Conf. Ser.* 1608.1 (Aug. 1, 2020), p. 012004. ISSN: 1742-6588, 1742-6596. DOI: [10.1088/1742-6596/1608/1/012004](https://doi.org/10.1088/1742-6596/1608/1/012004)

Støren, G. K., Dahlhaug, O. G., and **Solemslie, B. W.** “Signature Investigation of Typical Faults on Francis Turbines”. In: *J. Phys.: Conf. Ser.* 1608.1 (Aug. 1, 2020), p. 012003. ISSN: 1742-6588, 1742-6596. DOI: [10.1088/1742-6596/1608/1/012003](https://doi.org/10.1088/1742-6596/1608/1/012003)

Solemslie, B. W., Dahlhaug, O. G., Sigurdsson, B., and Tengs, E. O. “Modal Testing of the Francis-99 Runner”. In: *IOP Conf. Ser.: Earth Environ. Sci.* 774.1 (June 1, 2021), p. 012043. ISSN: 1755-1307, 1755-1315. DOI: [10.1088/1755-1315/774/1/012043](https://doi.org/10.1088/1755-1315/774/1/012043)

Gautam, S., Chitrakar, S., Neopane, H. P., **Solemslie, B. W.**, and Dahlhaug, O. G. “Numerical Investigation of a Pelton Turbine at Several Operating Conditions”. In: *IOP Conf. Ser.: Earth Environ. Sci.* 1037.1 (June 1, 2022), p. 012053. ISSN: 1755-1307, 1755-1315. DOI: [10.1088/1755-1315/1037/1/012053](https://doi.org/10.1088/1755-1315/1037/1/012053)

Solemslie, B. W., Østby, P. T., and Iliev, I. “Decomposition of the Structural Response of the Francis-99 Runner during Resonance.” In: *IOP Conf. Ser.: Earth Environ. Sci.* 1079.1 (Sept. 1, 2022), p. 012093. ISSN: 1755-1307, 1755-1315. DOI: [10.1088/1755-1315/1079/1/012093](https://doi.org/10.1088/1755-1315/1079/1/012093)

Abregu, J., Acharya, N., and **Solemslie, B. W.** “Review on Erosion Phenomenon, Maintenance, and Financial Calculation of Lifetime as an Asset for Pelton Turbines”. In: *J. Phys.: Conf. Ser.* 2629.1 (Nov. 1, 2023), p. 012008. ISSN: 1742-6588, 1742-6596. DOI: [10.1088/1742-6596/2629/1/012008](https://doi.org/10.1088/1742-6596/2629/1/012008)

Ludwig Kuhn, W., **Solemslie, B. W.**, Hihn, J.-Y., and Dahlhaug, O. G. “Evaluating Natural Degassing in a River to Create a Baseline for Comparison to Technical Degassing Methods.” In: *J. Phys.: Conf. Ser.* 2629.1 (Nov. 1, 2023), p. 012032. ISSN: 1742-6588, 1742-6596. DOI: [10.1088/1742-6596/2629/1/012032](https://doi.org/10.1088/1742-6596/2629/1/012032)

Kverno, J., Iliev, I., **Solemslie, B. W.**, and Dahlhaug, O. G. “Calibration of Strain Gauges on a Model Runner Blade Combining Numerical and Experimental Data”. In: *J. Phys.: Conf. Ser.* 2629.1 (Nov. 1, 2023), p. 012009. ISSN: 1742-6588, 1742-6596. DOI:

[10.1088/1742-6596/2629/1/012009](https://doi.org/10.1088/1742-6596/2629/1/012009)

Kverno, J., Vefring, G. E., Iliev, I., **Solemslie, B. W.**, and Dahlhaug, O. G. “Challenges with Onboard Strain Measurements on a Model Francis Turbine Runner”. In: *J. Phys.: Conf. Ser.* 2629.1 (Nov. 1, 2023), p. 012004. ISSN: 1742-6588, 1742-6596. DOI: [10.1088/1742-6596/2629/1/012004](https://doi.org/10.1088/1742-6596/2629/1/012004)

Abregu, J., Scheuer, J., Satyal, S., **Solemslie, B. W.**, and Dahlhaug, O. G. “Evaluation of the Jet Distortion by Sediment Erosion in the Needle in the Pelton Turbines”. In: *IOP Conf. Ser.: Earth Environ. Sci.* 1385.1 (Aug. 1, 2024), p. 012005. ISSN: 1755-1307, 1755-1315. DOI: [10.1088/1755-1315/1385/1/012005](https://doi.org/10.1088/1755-1315/1385/1/012005)

Ludwig Kuhn, W., **Solemslie, B. W.**, Hihn, J.-Y., and Dahlhaug, O. G. “Ultrasonic Degassing of Total Dissolved Gas Supersaturated, Flowing Water in a Laboratory Flume”. In: *IOP Conf. Ser.: Earth Environ. Sci.* 1385.1 (Aug. 1, 2024), p. 012018. ISSN: 1755-1307, 1755-1315. DOI: [10.1088/1755-1315/1385/1/012018](https://doi.org/10.1088/1755-1315/1385/1/012018)

Kuhn, W. L., **Solemslie, B. W.**, Hihn, J.-Y., and Dahlhaug, O. G. “Methods to Prevent or Mitigate Total Dissolved Gas Supersaturation in the Waterways Downstream Hydropower Plants”. In: *IOP Conf. Ser.: Earth Environ. Sci.* 1442.1 (Jan. 1, 2025), p. 012007. ISSN: 1755-1307, 1755-1315. DOI: [10.1088/1755-1315/1442/1/012007](https://doi.org/10.1088/1755-1315/1442/1/012007)

Theses

Solemslie, B. W. “Experimental Methods and Design of a Pelton Bucket”. PhD thesis. Trondheim: NTNU, 2016

Solemslie, B. W. “Optimalisering Av Ringledning for Peltonturbin”. MA thesis. Trondheim, Norway: NTNU, 2010