Gustaf Bjurstam

(+46) 72-71 172 10
gustaf@bjurstam.eu
www.bjurstam.eu
Nationality: Swedish

Education

I began a separate degree in applied mathematics during the final years of my engineering studies.

2023– **Master of Science in Applied & Computational Mathematics**, KTH Royal Institute of Technology, Stockholm
Thesis title: *Cut Finite Element Approximation of the Mean Curvature Vector*.

2023–2025 **Master of Science in Engineering Mechanics**, KTH Royal Institute of Technology, Stockholm
Specialisation: Solid Mechanics.
Completed within the five-year Engineering Materials Design civilingenjör programme.
Thesis: *Data-driven Constitutive Modelling of Expanded Polystyrene Foams*.

2020–2023 **Bachelor of Science in Technology**, KTH Royal Institute of Technology, Stockholm
First-cycle degree within the same five-year programme.

Grades Weighted grade point average: 4.84/5 across graded KTH coursework; 375.5 ECTS completed at KTH.

2022 **Independent courses**, Stockholm Universitety, Stockholm
- MM5020 Abstract algebra
- MM5021 Foundations of Analysis

Research Interests

Applied numerical analysis and scientific computing for PDEs, with emphasis on finite element methods, unfitted discretizations, computational mechanics, and multiphysics problems.

Work Experience

2025 **Course Materials Developer**, KTH Royal Institute of Technology, Department of Engineering Mechanics, Stockholm
Developed interactive teaching material for a faculty-oriented course on machine learning and data-driven methods in engineering mechanics.

2024 **R&D Intern**, Mondi Dynäs, Kramfors
- Conducted statistical analysis on the variability of paper properties to support quality control operations.
- Developed predictive models correlating routine laboratory measurements with customer-critical, hard-to-measure material properties.

2021–2023 **Teaching Assistant**, KTH Royal Institute of Technology, Department of Mathematics, Stockholm
Led tutorial sessions (including as the sole TA for a 138-student cohort) and graded hundreds of assignments and exams across the following courses:
- SF1625 Calculus in one variable – Fall 2021
- SF1624 Algebra and geometry – Fall 2021
- SF1633 Differential Equations I – Fall 2022
- SF1632 Complementary Course in Differential Equations and Transforms – Spring 2023

Selected Projects

2026 **Cut finite element approximation of the mean curvature vector**, *M.Sc. thesis in Applied & Computational Mathematics, KTH* *Link to thesis & code*
Stabilized unfitted finite element methods for approximating the mean curvature vector on closed surfaces. Extends existing linear CutFEM theory on piecewise flat surfaces to curved approximate surfaces and multilinear spaces, enabling quadrilateral/hexahedral background meshes through additional normal-derivative stabilization. Numerical validation and higher-order experiments implemented in C++ using an in-house CutFEM library built on FreeFEM++ finite element spaces, meshes, and data structures.

2025 **Data-driven constitutive modelling of expanded polystyrene foams**, *M.Sc. thesis in Engineering Mechanics, KTH / Mips AB* *Link to thesis, code, & archive*
Developed thermodynamically consistent data-driven constitutive models for expanded polystyrene foams using inelastic Constitutive Artificial Neural Networks. The models were trained on artificial EPS-like data to represent nonlinear inelastic material response relevant to energy-absorbing applications. The training framework was implemented in TensorFlow, and learned models were exported to Fortran routines suitable for integration into external finite-element material-model workflows.

2025 **TekMek Machine Learning Retreat 2025**, *KTH Engineering Mechanics | GitHub link*
Prepared implementation-oriented Jupyter notebooks for a faculty-oriented course on machine learning and data-driven methods in engineering mechanics. Published notebooks cover linear and logistic regression, supervised classification, PCA, neural networks, recurrent models, and sparse identification of dynamical systems; additional prepared material covered convolutional neural networks and autoencoders.

2022–2023 **Teaching notes for differential equations and transforms**, *bjurstam.eu/maths*
Prepared Swedish tutorial notes for undergraduate courses in differential equations and transform methods while working as a teaching assistant at KTH. The material consists mainly of exercise-based session notes with worked solutions and explanations for tutorial teaching.

Selected Advanced Coursework

CutFEM Selected Topics in Numerical Analysis II, third-cycle course at Institut Mittag-Leffler during the programme *Interfaces and Unfitted Discretization Methods*.

Applied math Parallel Computations for Large-Scale Problems; Matrix Computations for Large-Scale Systems; Inverse Problems; Computational Methods for Stochastic Differential Equations.

Mechanics Advanced Computation in Fluid Mechanics; Mechanics of Fibre Networks and Materials; Fatigue.

Technical Competencies

Programming C++, Julia, Python, Fortran, MATLAB

Libraries Gridap.jl, FEniCS, FreeFEM++, MPI, TensorFlow, PyTorch

Tools Git, LaTeX, Linux, Slurm

Scholarships & Awards

2025 **V. Eggertz's stipendiestiftelse**, *Bergsstiftelserna*, 42 000 SEK
Competitive merit-based KTH scholarship for students in the Materials Design programme; received the highest awarded amount in the annual round.

2025 **Stiftelsen Hjalmar Berwalds Minne**, 10 000 SEK
Triennial scholarship awarded as encouragement for outstanding mathematical studies; received the highest awarded amount in the round.

2024 **Överståthållare Gustaf Tamms stipendiestiftelse**, *Bergsstiftelserna*, 48 000 SEK
Competitive merit-based KTH scholarship for students in the Materials Design programme; received the highest awarded amount in the annual round.

2023 **Bergsingenjören Tore Nelsons minnesstiftelse**, *Bergsstiftelserna*, 85 000 SEK
Competitive merit-based KTH scholarship for students in the Materials Design programme; received the highest awarded amount in the annual round.

2022 **Stiftelsen Hjalmar Berwalds Minne**, 10 000 SEK
Triennial scholarship awarded as encouragement for outstanding mathematical studies; received the highest awarded amount in the round.

Leadership and Service

2021–2022 **Vice President**, *THS Bergssektionen*
Responsible for chapter finances, budgeting, and bookkeeping.

2020–2021 **Board Member**, *THS Bergssektionen*

Languages

Swedish Native

English Fluent

German Reading knowledge *upper-secondary coursework*