Curriculum vitae with track record

Personal information

First name, Surname:	Espen Robstad Jakobsen		
Date of birth:	11.04.1972	Sex:	Male
Nationality:	Norwegian		
Researcher unique identifier:	https://orcid.org/0000-0003-4432-1589		
URL for personal website:	https://www.ntnu.edu/employees/espen.jakobsen		

Education

2001	Ph.D., Department of Mathematical Sciences, NTNU, Norway
1996	Master, Department of Mathematical Sciences, NTNU, Norway

Positions

2008-	**Professor / NTNU / Norway**
2005-2008	*Associate Professor* / NTNU / Norway
2002-2005	*NFR PostDoc* / NTNU, University of Oslo, University of Tours / Norway, France *Associate Professor (temporary)* / NTNU and University of Bergen / Norway
1998-2001	*NFR PhD fellow*/NTNU/Norway
2009, 2015	Sabbaticals: University of Tours (2009-2010), Ecole Normale Superieur Paris (2015-2016)

Project management experience

Year	Project owner - Project funding (project leader) - Role - Funder
2026-2027	IE/NTNU - Conservation laws and Hamilton–Jacobi equations: Nonlocal effects, control and discontinuities. 80 kNOK - Main PI - NFR Aurora (mobility Norway-France).
2022-2028	IE/NTNU - *IMod. Partial differential equations, statistics and data: An interdisciplinary approach to data-based modelling* (M. Ehrnstrøm) 25 MNOK - PI - NFR FriPro.
2016-2022	IE/NTNU - Toppforsk project (research excellence): *Waves and Nonlinear Phenomena* (H. Holden) 25 MNOK - PI - Research Council of Norway (NFR FriPro)
2012-2016	IME/NTNU - Researcher Project: *Discrete Models in Mathematical Analysis* (Y. Ljubarski) 8 MNOK - PI - Research Council of Norway (NFR FriPro)
2006-2010	IME/NTNU - Researcher Project: *Integro-PDEs: Numerical methods, Analysis, and Applications to Finance*, 3.5 MNOK - Main PI - Research Council of Norway (NFR eVITA)
2003-2005	IME/NTNU - PostDoc Project: *Viscosity methods, Hamilton-Jacobi-Bellman equations, and applications to finance* - Main PI - Research Council of Norway (NFR FriPro)

Supervision of students and postdocs

Master students	38	NTNU (35), University of Bergen (2), Ecole Normale Superieur Paris (1)
Ph.D. students	5 (+6)	NTNU / Norway (co-advisor of 6)
PostDocs	7	NTNU / Norway - including 5 incoming **ERCIM Alain Benssousan** postdoc's

Other relevant professional experiences

2021-2029, (2 periods)	**Elected member of IE faculty board,** NTNU (IE has about 1000 staff and 1 bn NOK budget). **Member of IE faculty hiring board,** NTNU.
2011-2020	**Head** of Differential Equations and Numerical Analysis group, NTNU (50+ scientific staff) **Member of Math-Department board** (utvidet ledergruppe), NTNU
2005-	**Math-Department NTNU:** deputy head of research group, administrator of Professor and PhD committees; PhD hiring and pedagogical committees; organising research seminars. **IME/IE Faculty NTNU:** Member of the Research committee. **External:** Member of 8 PhD committees (Paris, Oslo, Madrid, Rome, Copenhagen, Uppsala), Professor and Associate Professor evaluation committees (Stavanger, Oslo, Bergen), referee for Professor positions (India, Australia), funding proposal evaluator (Canada, Poland).
2019-, '24-	**Associate editor:** *IMA journal of Numerical Analysis* (UK), *Mathematica Scandinavica*
2018-	**Elected member** of the Royal Norwegian Society of Sciences and Letters (DNKVS)
1999-	**Major collaboration:** *N. Alibaud* (Besancon), *E.Chasseigne* and *G. Barles* (Tours), *K.H. Karlsen* (Oslo), *F. del Teso* (Madrid), *J. Endal* (NTNU), *I. Chowdhury* (Kanpur), *A. Rutkowski* (Wroclaw).
2003-	**Referee** of 65+ papers for 30+ international research journals, including top journals Acta Math, JMPA, MAAN, JLMS, AIHPC, SINUM, SICON, SIMA, JDE, CPDE, MCOMP, JSAA, AAP.
	Organised meetings: Lecture series on stochastic PDEs and computer-assisted proofs in analysis (interval arithmetics) - Trondheim 2025 | TMS Colloquium on PDEs - Trondheim 2024, Workshop on PDEs, Spatio-Temporal Statistics, and Data-Driven Methods in Neuroscience and Fluid Mechanics - Trondheim 2024 |The Abel Symposium 2023**:** Partial Differential Equations: Waves, Nonlinearities and Nonlocalities - Orkanger Norway 2023, Workshop on nonlocal and nonlinear PDEs - Trondheim 2023 | First, Second, and Third Norwegian meeting on PDEs - Trondheim 2019, Bergen 2022, Oslo 2024 | Waves and Nonlinear Phenomena - Trondheim 2022, and older meetings. Many of these meetings have been co-organized with Mats Ehrnström (proposed centre director) and other PI's of the SFF application.
	Presentations: 46 talks at international conferences, 38 talks at seminars.
	Fellowships, awards, and prizes: National PhD fellowship (1997), Esso Prize for best PhD thesis (NTNU, 2002), Carl Erik Fröberg Prize for best paper, BIT J. Numerical Math. (2006)
	Minor grants/awards: 6 Trond Mohn Foundation grants to fund workshops/meetings, several different grants to fund the Abel symposium 2023.

Track record

60 publications during the career: 53 in journals, 5 in conference proceedings, 2 book chapters. One edited monograph. Co-authored with 26 researchers in 8 countries. **73% of journal publications in level 2 journals**, the top 20 % journals in the Norwegian ranking. In all co-authored publications I have contributed fully in planning, proofs of results, and writing.

Citations/h-index (20.12.2025): Google scholar 2543/28, MathSciNet 1219/NA, Web of Science 1308/21.

Summary of research: Nonlinear partial differential equations and related fields like stochastic processes, stochastic control, mean field games, and numerical analysis. Both local and nonlocal problems have been studied using a variety of tools from functional, stochastic, and numerical analysis along with probability and control theory: Mean field game-, porous medium-, convection-diffusion-, and Bellman equations.

I. ***Nonlocal operators:*** Through a new analysis of the Liouville theorem we have improved a famous classical theory that has been continuously developed since the 19th century. Published in a top journal:

1. N. Alibaud, F. del Teso, J. Endal, and E. R. Jakobsen. *The Liouville theorem and linear operators satisfying the maximum principle.* J. Math. Pures Appl., 142, 2020.

Combining stochastic, probabilistic, and analytic tools, we have also studied nonlocal operators of Fokker-Planck type (paper [35] on https://erj.folk.ntnu.no/publications.html).

II. ***Mean field game theory:*** Mean field games (MFGs) with nonlocal diffusion and fully nonlinear MFGs. Pioneering initial work on well-posedness and numerics. Work on long time behavior and Master equations for fractional MFGs. Several long and technical papers, including one in top journal JEMS, e.g.

2. I. Chowdhury, E. R. Jakobsen, and M. Krupski. *On fully nonlinear parabolic mean field games with examples of nonlocal and local diffusions.* SIAM J. Math. Anal. 56(5):6302-6336, 2024.
3. E. R. Jakobsen and A. Rutkowski. *The master equation for mean field game systems with fractional and nonlocal diffusions.* J. Eur. Math. Soc. (JEMS), online first, 2025.

III. ***Porous medium equations:*** We develop a new and unified mathematical theory that encompasses a much larger class of equations than previously considered: both local, general nonlocal, and surprisingly to the experts, numerical discretisations. The framework has been used to propose and analyse numerical schemes in a very general setting, recently also for Caffarelli-Vaquez's equation with fractional pressure (paper [P4]). The paper below represents the first theoretical development.

4. F. del Teso, J. Endal, and E. R. Jakobsen. *Uniqueness and properties of distributional solutions of nonlocal equations of porous medium type.* Advances in Mathematics 305, 2017.

IV. ***Nonlocal convection-diffusion:*** Seminal (according to referee) analytical results explaining how to handle degenerate nonlocal conservation laws. Opened a new class of equations for mathematical study.

5. S. Cifani and E. R. Jakobsen. *Entropy solution theory for fractional degenerate convection-diffusion equations.* Ann. Inst. H. Poincare Anal. Non Lineaire 28, 2011.
6. N. Alibaud, J. Endal, E. R. Jakobsen, and O. Mæhlen. *Nonlocal degenerate parabolic-hyperbolic equations on bounded domains.* Ann. Inst. H. Poincare Anal. Non Lineaire (online first), 2025.

Development and analysis of different numerical schemes for such equations, here represented by a paper where we propose and analyse a high order scheme that converges even for discontinuous shock-solutions.

7. S. Cifani and E. R. Jakobsen. *On the spectral vanishing viscosity method for periodic fractional conservation laws.* Math. Comp. 82, 2013.

V. ***Fully nonlinear equations and stochastic control:*** Fundamental contributions to analysis and numerics, for local and nonlocal problems. Pioneering work include first rigorous proof of well-posedness for mixed local-nonlocal equations and switching control of jump processes with dynamic programming:

8. E. R. Jakobsen and K. H. Karlsen. *A "maximum principle for semicontinuous functions" applicable to integro-partial differential equations.* NoDEA Nonlinear Differential Equations Appl. 13, 2006.
9. I. H. Biswas, E. R. Jakobsen, and K. H. Karlsen. *Viscosity solutions for a system of integro-PDEs and connections to optimal switching and control of jump-diffusion processes.* Appl. Math. Optim. 62, 2010.

Other analytical results include stability, continuous dependence, singular limits, nonlocal boundary value problems, quasilinear nonlocal equations. My work on numerical methods spans different methods, equations, and results. Especially well-known are results on (i) nonlocal problems, and (ii) error estimates for fully nonlinear equation, here represented by my most cited paper:

10. G. Barles and E. R. Jakobsen. *On the convergence rate of approximation schemes for Hamilton-Jacobi-Bellman equations.* M2AN Math. Model. Numer. Anal. 36, 2002.

VI. *Other research directions:* New duality between Bellman and convection-diffusion equations (paper [47]), numerical solution of *Fokker-Planck equations* (paper [34]), approximate *stochastic control* (paper [38]), *deep BSDE* approximation of PDEs (paper [P5]), FEM approximation of *stochastic PDEs* (paper [P6]), and *mathematical biology* (paper [41]).

Fellowships, awards, and prizes:

1997 National PhD fellowship (Research Council of Norway)

2002 Esso Prize for best PhD thesis in fundamental research, NTNU

2006 Carl Erik Fröberg Prize for best paper, BIT J. Numerical Math./Sweden

Presentations:

42 talks at international conferences, 37 talks at seminars. Selected invited presentations:

2025 Durham Symposium on Mean Field Games, Durham University, UK.
The European Conference on Numerical Mathematics and Advanced Applications, Heidelberg.

2024 Norwegian meeting on PDEs 2024, Oslo, Norway.

2023 SPDEs, optimal control and mean field games - analysis, numerics and applications, Bielefeld.
Euro-Japanese conference on nonlinear diffusions, ICMAT, Madrid, Spain.

2022 Nonlocal Equations: Analysis and Numerics, Bielefeld, Germany.
Regularity for nonlinear diffusion equations. Green functions and functional inequalities, Madrid.

2021 Oberwolfach Workshop: Numerical Methods for Fully Nonlinear and Related PDEs, Germany.

2020 NMAC20 Online Conference on Nonlocal Problems, China.

Selected early career contributions:

Jørgen Endal (PhD and postdoc): Associate Professor, NTNU. Chorafas Foundation Award winner and Marie Skłodowska-Curie individual Fellow (UAM Spain).

Felix del Teso (pre and postdoc): Ramón y Cajal Research Fellow, Autonomous University Madrid. UAM PhD Thesis and Vicent Caselles Prizes, ERCIM Alain Benssousan and Juan de la Cierva Fellows, Ramon Y Cajal grant.

Imran H. Biswas (PhD): Associate Professor/Reader, TIFR Bangalore, India.

Indranil Chowdhury (postdoc): Assistant Professor, IIT Kanpur, India.

Sehail Mazid (postdoc): Associate Professor, University of Agadir, Morocco.

Miłosz Krupski (postdoc): Assistant Professor until 2024, University of Wroclaw, Poland.

Artur Rutkowski (postdoc): Associate Professor, Technical University of Wroclaw, Poland.