TERJE RØLVÅG

Professor

ABOUT

Date of birth: 16.101963
Gender: Male
Nationality Norwegian
Languages: Norwegian, English and (some) German

CONTACT

📱 (+47) 40065114
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KEY COMPETENCE

Rølvåg's research interests cover computer science applied for engineering applications focusing on structural analysis of flexible mechanisms and electromechanical products. The simulation techniques are based on non-linear Finite Element formulations and control science (FEDEM). His research focus is currently modeling, simulation and physical benchmarking of Digital Twins for structural monitoring and predictive maintenance.

EDUCATION

NTNU/Machine Department	MSc	1983-1986
NTNU/Engineering Cybernetics	PhD	1988-1991

PROFESSIONAL EXPERIENCE

Senior Research Scientist	SINTEF OCEAN	2020 -
Professor	NTNU, Institutt for havroms operasjoner og byggteknikk	2020 -
Professor	Oslo Met, Faculty of Technology	2023 -
Professor	NTNU, Maskinteknikk og Produksjon	2003 - 2020
Visiting Professor	Embry Riddle Aeronautic University	2014 - 2015
R&D Project Manager	SAP/Predictive Engineering Insight	2017 - 2020
R&D Manager	MXRR Srl. (race engine development)	2014 -
R&D Manager	VP AS (windmill engineering)	2007 - 2010
R&D Manager	BR Consulting Srl. (gearbox analysis)	2005 - 2007
Managing Director	TRAC (www.trac.no)	1999 -
Managing Director	Fedem Technology AS	1997 - 1999
Technical Manager	Fedem Technology AS	1996 - 1997
Group Leader	SINTEF Machine and Product Design	1995 - 1997
Research Scientist	SINTEF Material Technology	1991 - 1995
Research Scientist	SINTEF Production Engineering	1988 - 1991
Project Engineer	ITEC/NORTEST	1986 - 1987

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COURSES (TEACHING)

NTNU	Digital Twin Technology (MSc)	2021 -
NTNU	Finite Element Applications in Mechanical Engineering (MSc)	2018 -
NTNU	Product Simulation (PhD)	2018
NTNU	Advanced Product Simulation (PhD/MSc)	2018
NTNU	Product Development and Materials Technology (MSc)	2003 - 2017
NTNU	Industrial IKT Intro (BSc)	2003 -
NTNU	Mechanical Vibrations (MSc)	2010 - 2014
NTNU	System Engineering (Lean Systems Engineering part / LEfSE)	2010 - 2014

MANAGEMENT AND EXPERIENCE

EDF/dThor (Digital Twins for SHM)	IoT Task leader	2022 -
INTELLIGATE Mast crash simulations	Project manager	2020
DEFINE (multidisciplinary 3D Digital modEls For AIT environment)	Project supervisor for ESA	2019 - 2022
CHRYSTAL (Winglet design and manufacturing)	Project manager	2016 - 2017
Capture and Reuse of Engineering Knowledge in Digital Twins (PhD thesis)	PhD Supervisor	2016 -
Lattix frangible road and aviation masts	Project manager	2012 - 2015
Product Development and testing of Artificial Pancreas (https://www.apt-norway.com/)	Product Testing	2016 -
Dynamic simulation and fatigue analysis of soft mount for MG5 machine gun for (Rheinmetal)	Project manager	2013
SupLight, EC project (IP project number 263302), responsible for multidiscipline shape and topology optimization of aviation structures in recycled aluminum	Project Manager for WP3	2010 - 2014
Design, dynamic simulation and verification of the IDG radar for the Norwegian Frigates	Project Manager	2002 - 2003
Modeling and dynamic deployment simulation of Ariane 5 nozzle extension and drive system VINCI for Kongsberg Defence System	Simulation Manager	2000 - 2001
ESPRIT II #5524 MDS (High performance Computing for Multidiscipline Dynamic Simulation of Mechanisms)	Project Manager	1987-2000
ESA study (SAR Deployment Modeling Study), (project lead and execution). In this project I did the modeling and simulation of the ASAR, GOMOS, MIMR RDM and PDM deployment mechanisms at ENVISAT	Project Manager	1994-2000

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Multidiscipline Dynamic Simulation project SOFIA for CSEM | Project Manager | 2000 - 2002

LAB ACTIVITIES/ TESTING/ DIGITAL TWINS

Digital Twin Monitoring of Mountain Bikes (structural health)	2020 -
Digital Twin Monitoring of Offshore Crane (structural health)	2020 -
Digital Twin based structural monitoring and testing of high-speed electric engines aircrafts (E-Fan X) and race bikes (DUCATI)	2019 -
Experimental Studies of Knuckle Boom Cranes (Digital Twin cloud implementation)	2018 -
Digital Twin based structural monitoring of the Stavå Bridge, Lerkendal Arena and Windmills (see video here)	2017 -
Fatigue Testing of Sub-frames and race engines	2005 - 2019
Digital Twin based structural monitoring of Automotive Suspension systems	2016 - 2018

All digital twin projects involve instrumentation and monitoring based on various structural and thermal sensors. The sensors were linked to CATMAN which was streaming sensor data to digital twins (FMUs in the cloud) providing additional information supporting structural monitoring and predictive maintenance.

SELECTED PUBLICATIONS

Digital Twin Based Structural health Monitoring of Offshore Crane, Terje Rølvåg and Øystein Stranden, 41st International Conference on Ocean, Offshore & Arctic Engineering, OMAE 2022	2022
ISO 10303 AP209—Why and how to embed nonlinear FEA, Remi Lanza, Jochen Haenisch, Kjell Bengtsson, Terje Rølvåg, Advances in Engineering Software 154 (2021), ELSEVIER, 102976	2021
Digital Twin Based Condition Monitoring of a Knuckle Boom Crane; an Experimental Study, Torbjørn Moi, Andrej Ciblicik and Terje Rølvåg, Engineering Failure Analysis v112 (104517)	2020
Fatigue analysis of high performance race engines, T. Rølvåg, B.Haugen, Matteo Bella and F. Berto, Engineering Failure Analysis v112 (104514)	2020
Shark attacks on offshore streamer cables, T. Rølvåg, A.B.Hagen and T.B.Hagen, Engineering Failure Analysis v110 (104403)	2020
Trade Study to Select Best Alternative for Cable and Pulley Simulation for Cranes on Offshore Vessels, Gaute Fotland Cecilia Haskins and Terje Rølvåg, The Journal of The International Council of Systems Engineering (INCOSE)	2019
Relating Structural Test and FEA Data with STEP AP209, R.Lanzaa, J.Haenisch, K.Bengtsson, and T.Rølvåg, accepted for publication in the International Journal of Advances in Engineering Software	2018

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Leanification of the Engineering Process for Customized Road safety Products, S. Ulonska, T. Welo and T. Rølvåg, Int. Design Conference - DESIGN	2018
Dynamic Test Bench for Motocross Engines, T Rolvag and Matteo Bella, International Journal of Advances in Mechanical Engineering (IJAME), Vol.9(10) 1-19, SAGE Open Access	2017
FE simulation of soft wing impactor for aviation mast frangibility testing – sensitivity to model assumptions, International Journal of Crashworthiness, Terje Rølvåg, Torgeir Welo, Rien van Houten & Jaap Wiggenraad	2016
Product architecture design of multi-modal products. Liu, Cong; Hildre, Hans-Petter; Zhang, Houxiang; Rølvåg, Terje. (2016) , Res Eng Design 26:219–234, DOI 10.1007/s00163-015-0193-0	2015
Conceptual design of multi-modal products. Liu, Cong; Hildre, Hans-Petter; Zhang, Houxiang; Rølvåg, Terje. Research in Engineering Design.vol. 26 (3).	2015
Multidisciplinary FEA based modeling and simulation of Moto GP Racing bike, Terje Rølvåg, International Journal of Vehicle Systems Modeling and Testing (IJVSMT)	2014
Influence of Pole and Slot Combinations on Magnetic Forces and Vibration in Low-Speed PM Wind Generators, M. Valavi, A. Nysveen, R. Nilssen, T. Rølvåg, IEEE Transactions on Magnetics, TMAG-13-07-0462.R1 m	2014
Construction of an instrumented roller ski and validation of three-dimensional forces in the skating technique, M. Hoset, A. B. Rognstad, T. Rølvåg, G. Ettema & Ø. Sandbakk, Sports Engineering ISSN 1369-7072, Sports Eng.	2013
A method for controller parameter estimation based on perturbations, Bratland, M., Haugen, B., and Rølvåg, T, Printed :Engineering with Computers, An International Journal for Simulation Based Engineering, ISSN 0177-0667, Springer	2013
Modal analysis of active flexible multibody systems, Bratland, M., Haugen, B., and Rølvåg, T, Printed : Computers and Structures, vol. 89, pp. 750-761	2011
ESA Study – SAR Modelling and Simulation Results, Terje , Proceedings of the 8th European Space Mechanisms and Tribology Symposium, Toulouse, France, Pages 313-320, ESA SP-438 (September 1999)	1999
Simulation and Verification of the GOMOS Steering Front Assembly, Terje Rølvåg and Martin Humphries, Proceedings of ESM98 Simulation – Past, Present and Future, Conference, June 16-19, Manchester, UK, ISBN 1-56555-148-6, Printed in Delft, The Netherlands, SCS Publication	1998
Mechatronic design methodology, H.P. Hildre and T. Rølvåg. International Conference on Engineering DesigN. B.1,[Edition Heurista] ; [1995].Pages 195-196, Reference: UBIT - TEK Eske 707	1995
Modal analysis of elastic mechanisms, T. Rølvåg and H.P. Hildre, Reprint from: SIMS Simulation Conference. UBIT - TEK NTHx 6706	1993
Multidiscipline simulation of elastic manipulators, T. Rølvåg, H. P. Hildre, O. I. Sivertsen and Å. Ø. Waløen. Royal Norwegian Council for Scientific and Industrial Research], P. [221]-240 : ill, Reprint from: Modeling, identification and control, 13(1992) no 4, UBIT - TEK NTH	1992
Multidiscipline dynamic simulation of elastic manipulators and space structures, Rølvåg, Terje Trondheim : Division of Machine Design, NTH. PhD Thesis ; 1992:3, ISBN 82-7119-351-1, UBIT - TEK 621.865.8.001.57 R99m	1991
PATENT: *Virtual Pivot Axis Spring EP11731145.6 / 201001003 used in several space mechanisms. The patent describes a flexible structure that allows +/-5 degrees rotation about a virtual axis without drifting of the pivot axis (designed and benchmarked in FEDEM)*	2012

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SOFTWARE DEVELOPMENT

I have more than 10 years' experience with CAE software development in Fortran, C and C++. From 1988 to 1994, I was programming many of the basic formulations in FEDEM. I was also in charge of the FEDEM software development in two periods (at SINTEF and FEDEM Technology AS).

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