# doc. Ing. Lukáš Novák, Ph.D.

## Personal information


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| Phone number/e-mail: | +420 608 511 448/ Lukas.Novak4@vut.cz |
| Citizenship: | Czech Republic |
| Affiliation: | Associate Professor<br>Institute of Structural Mechanics, Faculty of Civil Engineering<br>Brno University of Technology<br>Veveří 331/95, 602 00 Brno, Czech Republic |


## Education

Brno University of Technology (BUT), Faculty of Civil Engineering (FCE)
Civil Engineering, Building Constructions, Structural mechanics

Habilitation, 'doc.' (2024), topic: Uncertainty Quantification in Civil Engineering
Doctoral degree 'Ph.D.' (2018-2021), thesis: Surrogate Modelling and Safety Formats in Probabilistic Analysis of Structures (in English). Supervisor: prof. Ing. Drahomír Novák, DrSc.
Master's degree 'Ing.' (2012-2018), thesis: Probabilistic modeling of shear strength of prestressed concrete beams: sensitivity analysis and semi-probabilistic design methods (in Czech)

## Academic positions

Brno University of Technology: Associate professor since 1.11.2024
Brno University of Technology: Assistant professor since 1.1.2022
Brno University of Technology: Research associate 1.1.2017-1.1.2022
Brno University of Technology: Student researcher 1.1.2015- 1.1.2018
Advanced Materials, Technologies and Structures Center: Researcher 1.10.2016 - 30.09.2021

## Scientometric data

$\mathcal{H}$-index / citations: 11 (10) / 413 (316) according to Scopus (WoS)
Journal ISI papers $J_{imp}$ : 16 (WoS)/ conference papers $D$: 33 (Scopus)

## Academic awards

▪ Top 10 scientific results of FCE,BUT (yearly 2022-2026) ▪ Medal SIGNUM EXCELLENTIAE (FCE, BUT)
▪ Brno Ph.D. talent project (2019-2021) ▪ Josef Hlavka Award, Hlavka's foundation (17.11.2018)

## Professional stays, visiting positions, major international collaboration

▪ Visiting researcher at the Hopkins Extreme Material Institute, Johns Hopkins University, USA (01-07/2022)
▪ Short-term research stay at University of Natural Resources and Life Sciences, Vienna, Austria (08-09/2020)
▪ Short-term research stay at Hohai University, Nanjing, China (08-09/2019)
▪ project UQPy, member of the international developing team (since 2022, version 4.0)

## Research interests:

Physics-informed Polynomial Chaos Expansion ($PC^2$),Uncertainty quantification; Sensitivity analysis; Dimension reduction techniques; Statistical analysis; Structural safety; Theory of probability; Reliability of structures; Random fields; Artificial neural networks; Scientific machine learning

## Organizations and committee memberships:

▪ *fib* Task Group 3.1: Reliability of existing structures ▪ *fib* Action Group 8: Non-linear finite element modelling ▪ scientific committee of conference 'International Probabilistic Workshop' and 'International Workshop on Reliable Engineering Computing'

**Invited lectures at international institutions:**
▪ Hunan University, China (2026) ▪ TU Dortmund, Germany (2024) ▪ MASCOT-NUM, Institut de Mathématiques de Toulouse, France (2023) ▪ Johns Hopkins University, Hopkins Extreme Material Institute, USA (2021,2022) ▪ Hohai University, China (2019) ▪ Chuzhou College, China (2019)

**Selected research projects documenting research and activities (last 3 years):**

- 2026-2029 *Bayesian physics-informed polynomial chaos expansion* international project CZ-DE granted by Czech Science Foundation and DFG under project No. 26-24969L, **principal investigator**
- 2024-2027 *Physically Constrained Polynomial Chaos Expansion for Stochastic Mechanics* project Inter-Excellence II Inter-Action CZ-USA granted by Ministry of Education, Youth and Sports of Czech Republic under project No. LUAUS24260, **principal investigator**
- 2024-2026 *Multiscale modelling of spatial variability and crack propagation for sustainable concrete structures* granted by Czech science foundation under project No. 24-10892S, **principal investigator**
- 2024-2025 *Active Machine Learning for Identification of Characteristic Fatigue Curve* mobility project DE-CZ granted by Ministry of Education, Youth and Sports of Czech Republic under project No. 8J24DE002, **principal investigator**

▪ 2025-2028 *Innovative methods of material diagnostics and monitoring of engineering infrastructure to increase its durability and service life (INODIN)* granted by Ministry of Education, Youth and Sports of Czech Republic and co-financed by EU under project No. CZ.02.01.01/00/23_020/0008487, co-investigator ▪ 2024-2026 *Smart modeling of inelastic behavior in heterogeneous materials* granted by Czech science foundation under project No. 24-11845S, co-investigator ▪ 2022-2024 *Metamodel-assisted probabilistic assessment in bridge structural engineering (MAPAB)* granted by Czech science foundation under project No. 22-00774S, co-investigator

## Selected scientific publications from the last 3 years

Q. Lu, H. Sharma, M. D. Shields, and L. Novák, "Physics-informed polynomial chaos expansion with enhanced constrained optimization solver and d-optimal sampling", Probabilistic Engineering Mechanics **85**, 104001 (2026).
L. Novák, M. Valdebenito, and M. Faes, "On fractional moment estimation from polynomial chaos expansion", Reliability Engineering & System Safety **254**, 110594 (2025).
L. Novák, H. Sharma, and M. D. Shields, "Physics-informed polynomial chaos expansions", Journal of Computational Physics **506**, 112926 (2024).
H. Sharma, L. Novák, and M. Shields, "Physics-constrained polynomial chaos expansion for scientific machine learning and uncertainty quantification", Computer Methods in Applied Mechanics and Engineering **431**, 117314 (2024).
L. Novák, M. D. Shields, V. Sadílek, and M. Vořechovský, "Active learning-based domain adaptive localized polynomial chaos expansion", Mechanical Systems and Signal Processing **204**, 110728 (2023).

Complete list of the applicant's publications can be found at www.vutbr.cz.