Curriculum Vitae

Johannes Laurin Hörmann

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born on 29th June 1988
German

Research highlights

Experienced research professional specializing in computational modeling for micro- and nanotribology and materials science. Key achievements include:

- Established continuum models of rough interfaces using FEM to study solvent concentration variations on rough surfaces.
- Developed atomistic models of surfactant adsorption films using MD for Ph.D. research.
- Applied machine learning (GPC, GPR) to predict rough surface performance in an entrepreneurial venture.
- Co-coordinated proposal writing for the DFG-funded 'AWEARNESS' project, employing DFT to study zinc phosphate glasses typically grown as films in tribo-induced decomposition reactions of ZDDP, a common additive in engine oils.
- All these modeling contributions have been made possible by rigid design of reproducible workflows with well-established Workflow Management Systems (WMS).
- Leading developer and maintainer for the *dtool & dserver* data management ecosystem, a community effort.

Currently serving as Data Steward at the Cluster of Excellence *liv*MatS.

Education

07/2017-02/2025	**Ph.D. Microsystems Engineering** Simulation, Dept. of Microsystems Engineering (IMTEK), University of Freiburg, Germany Dissertation: *Friction of Adsorption Films with Reproducible Molecular Dynamics*
09/2014 to 01/2017	**Master Mechanical Engineering** Tsinghua University, Beijing, China Double Degree Master Program between Tsinghua University and Technische Universität Berlin Master thesis (grade 1.3, German scale): *Computational Modeling of Potential-Controlled Dodecyl Sulfate Ion Adsorption at the Aqueous and Non-aqueous SDS Solution – Stainless Steel Interface*
09/2012 to 03/2017	**Master Engineering Science** (grade 1.6, German scale) Technische Universität Berlin, Germany Foci: Mechatronics, Numerics & Simulation
09/2008 to 09/2012	**Bachelor Physics** (grade 2.0, German scale) Freie Universität Berlin, Germany Bachelor thesis (grade 1.0, German scale): *Large Scale Parallel Simulation of EPR Lineshape Spectra*

06/2007	**A-Level** (grade 1.3) Campe Gymnasium Holzminden, Germany Foci: Mathematics, Latin, Physics, Politics

Professional Experience

since 08/2021	**Data Steward** *liv*MatS Cluster of Excellence, University of Freiburg, Germany
05/2022 to 09/2023	**Co-founder** Start Up *Surface Design Solutions*
01/2021 to 2021/07	**Parental Leave**
since 02/2017	**Examiner** Academic examination office, a joint institution of the German Embassy's cultural department and the German Academic Exchange Service (DAAD) Conducting interviews for plausibility verification of academic records
09/2014 to 06/2015	**German Teacher** Peking University, preparatory courses for academic studies in Germany

Journal Publications

Hörmann, J. L.; Yanes, L.; Vazhappilly, A.; Sanner, A.; Holey, H.; Pastewka, L.; Hartley, M.; Olsson, T. S. G. *Dtool and Dserver: A Flexible Ecosystem for Findable Data*. PLOS ONE 2024, 19 (6), e0306100. https://doi.org/10.1371/journal.pone.0306100.

Grigorev, P.; Frérot, L.; Birks, F.; Gola, A.; Golebiowski, J.; Grießer, J.; **Hörmann, J. L.**; Klemenz, A.; Moras, G.; Nöhring, W. G.; Oldenstaedt, J. A.; Patel, P.; Reichenbach, T.; Rocke, T.; Shenoy, L.; Walter, M.; Wengert, S.; Zhang, L.; Kermode, J. R.; Pastewka, L. *Matscipy: Materials Science at the Atomic Scale with Python*. Journal of Open Source Software 2024, 9 (93), 5668. https://doi.org/10.21105/joss.05668.

Hörmann, J. L.; Liu, C. (刘宸旭); Meng, Y. (孟永钢); Pastewka, L. *Molecular Simulations of Sliding on SDS Surfactant Films*. J. Chem. Phys. 2023, 158 (24), 244703. https://doi.org/10.1063/5.0153397.

Seidl, C.; **Hörmann, J. L.**; Pastewka, L. *Molecular Simulations of Electrotunable Lubrication: Viscosity and Wall Slip in Aqueous Electrolytes*. Tribol Lett 2021, 69 (1), 22. https://doi.org/10.1007/s11249-020-01395-6.

Proceedings Publications

Hörmann, J. L. & Pastewka, L. Lightweight research data management with dtool : a use case. in Proceedings of the 7th bwHPC Symposium vol. 7 29–35 (Universität Ulm, 2022).

Hörmann, J. L. & Pastewka, L. SDS adsorptions films at the H2O – Au(111) interface: molecular dynamics study of AFM tip–surface contact. in NIC Series vol. 50 101–107 (Forschungszentrum Jülich, Jülich, Germany, 2020).

Awards and Funding

09/2022	**KTUR Summer School Entrepreneurship: Best Project Award** Leader of award-winning team *surfAIce*
05/2021 to 04/2022	**GCS/NIC Regular Project hfr21** Awarded 3.36 mio core-h computing time on HPC system JUWELS at the Jülich Supercomputing Center (JSC)
05/2020 to 04/2021	**GCS/NIC Regular Project hfr13** Awarded 3.4 mio core-h computing time on HPC system JUWELS at JSC
05/2019 to 04/2020	**GCS/NIC Regular Project hfr13** Awarded 2.2 mio core-h computing time on HPC system JUWELS at JSC
05/2018 to 04/2019	**GCS/NIC Regular Project hfr13** Awarded 2.6 mio core-h computing time on HPC system JUWELS at JSC
09/2017	**6th World Tribology Congress, Beijing: Best Poster Award**
09/2013 to 08/2014	**DAAD Annual Scholarship for Exchange Studies** Tsinghua University, Beijing, China
09/2010 to 09/2011	**DAAD Annual Scholarship for Language Studies / Huayu Enrichment Scholarship** National Sun Yat-Sen University, Kaohsiung, Taiwan

Supervision experience

01/2025	Co-supervised Bachelor thesis: *Microfluidic elements*
09/2024	Co-supervised Bachelor thesis: *Influence of electrode roughness on the ion concentration in electrochemical double layers: Finite element simulations in two dimensions*
since 2022	Supervision of various research assistants working on the *dtool & dserver* research data management ecosystem
09/2021	Co-supervised Bachelor thesis: *Finite element simulations of the electrochemical double layer structure under microscopic probes of various geometries*
07/2020	Co-supervised Master thesis: *Pressure and Voltage Effects on Lubrication by an Aqueous Electrolyte — A Molecular Dynamics Study*

Teaching experience

since 2021	Several hands-on workshops on research data management best practices
summer term 2020	Tutor for lecure *Simulation*
winter term 19/20	Tutor for lecture *Differential Equations*
summer term 2019	Lecture on classical force fields for molecular dynamics
winter term 18/19	Tutor for lecture *Differential Equations*
summer term 2018	Tutor for lecture *Simulation*

Conferences and and select presentations

09/2024	ASIATRIB2024 & CICT2024: 7th Asia International Conference on Tribology & 9th China International Conference on Tribology, Tianjin, China. Oral presentation: *Reproducible molecular simulations of sliding on SDS surfactant films with dtool and dserver, a flexible ecosystem for distributed data management.*
06/2024	9th European Nanomanipulation Workshop, Madrid, Spain. Oral presentation: *Sliding on SDS surfactant films -- molecular simulations.*
06/2024	ECCOMAS 2024: European Community on Computational Methods in Applied Sciences Congress 2024, Lisboa, Portugal. Oral presentation: *dtool and dserver: A flexible ecosystem for findable data.*
09/2023	ITC 2023: 9th International Tribology Conference, Fukuoka, Japan. Oral presentation: *Molecular simulations of sliding on SDS surfactant films.*
03/2023	LMS 2023: 1st International Conference and Scientific Exhibition on Living Materials Systems, Freiburg, Germany. Oral presentation: *Morphology, concentration, potential: Exploring tunable adsorption film friction with molecular dynamics.*
10/2022	MMM 2022: 10th Conference on Multiscale Materials Modeling, Baltimore, USA. Oral presentation: *Morphology, concentration, potential: Exploring tunable adsorption film friction with molecular dynamics.*
07/2022	WTC 2022: 7th World Tribology Congress, Lyon, France. Oral presentation: *Morphology, concentration, potential: Exploring tunable adsorption film friction with molecular dynamics.*
09/2021	116th AGEF Symposium on Triboelectrochemistry, Bonn, Germany. Oral presentation.
09/2019	46th Leeds-Lyon Symposium on Tribology, Lyon, France. Oral presentation.
10/2018	9th Conference on Multiscale Materials Modeling, Osaka, Japan. Oral presentation.
10/2018	Beilstein Nanotechnology Symposium 2018, Molecular Mechanisms in Tribology, Potsdam, Germany. Poster presentation.
09/2017	WTC 2017: 6th World Tribology Congress, Beijing, China. Poster presentation.

Skills & Qualifications

scientific methods	Finite Elements Method (FEM) with COMSOL, ANSYS, and FEniCSx
	Molecular Dynamics (MD) by GROMACS and LAMMPS
	Density Functional-based Tight Binding (DFTB) with Atomistica
	Density Functional Theory (DFT) with CASTEP
	Machine Learning (GPR, GPC) with gpflow and sklearn
	Computational Workflow Management with FireWorks and snakemake
	Research Data Management with dtool & dserver
DevOps skills	Github CI/CD, OpenStack, Docker, Podman, Singularity, Make, CMake, EasyBuild, lmod, Slurm, MongoDB, SQL databases, Flask, REST API
other tech skills	Python, C/C++, tcl, Lua, MATLAB, Mathematica, LaTeX
languages	German native, English fluent, Chinese fluent
driver's license	motorbike, car
interests	swimming, hiking, running, dancing, reading, cooking