

**Assoc.Prof. Dipl.-Ing Dr.techn. Manfred Ulz**

## Personal details

### Affiliation

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## Academic milestones

### Diplom- Ingenieur

Oct. 2000 – Sep. 2005

(with distinction) in Mechanical Engineering-Economics, Graz University of Technology, Austria

### Diploma Thesis

Aug. 2004 – Feb. 2005

“Vibration control of plate-like structures” at the Victoria University of Technology, Melbourne, Australia; a self-organised exchange programme

### Internship

Jul. 2005 – Sep. 2005

in ALICE group at CERN, Geneva, Switzerland - Structural building of ion detector

### Doktor der technischen Wissenschaften

Oct. 2005 – Mar. 2009

(with distinction) in Mechanical Engineering, Graz University of Technology, Austria

### Doctoral Thesis

Mar. 2009

supervisor Prof. Christian Celigoj – “A Green-Naghdi approach to finite anisotropic rate-independent and rate-dependent thermo-plasticity in logarithmic Lagrangean strain-entropy space”

### Scientific Assistant

Oct. 2005 – Oct. 2009

at the Institute of Strength of Materials, Graz University of Technology, Austria

### Post-Doctoral Fellow

Feb. 2010 – Dec. 2010

at the Department of Mechanical Engineering, University of California at Berkeley, USA (group of Prof. Panayiotis Papadopoulos)

### Assistant Professor

Jan. 2011 – Jun. 2016

at the Institute of Strength of Materials, Graz University of Technology, Austria

### Deputy Head

since Jan. 2011

of the Institute of Strength of Materials, Graz University of Technology, Austria

### Research stay

Sep. 2014

at the Courant Institute of Mathematical Sciences, New York University, NY, USA (group of Prof. Eric VandenEijnden)

### Habilitation

Jan. 2011 – May 2016

in the field “mechanics”, Graz University of Technology, Austria; Habilitation Thesis - “Atomistic-on-continuum coupling with applications to spatial averaging of atomistic stress and hierarchical multiscale methods”

### Associate Professor

since Jul. 2016

at the Institute of Strength of Materials, Graz University of Technology, Austria

### Research stay

Jan. 2019

at the Department of Applied Mechanics, Indian Institute of Technology Madras, Chennai, India (group of Prof. Pijush Ghosh)

**Research stay**

**Dec. 2019**

at the Department of Mechanical Engineering, University of California at Berkeley, USA (group of Prof. Panayiotis Papadopoulos)

## Main areas of research

### Atomistic-to-continuum coupling in solid mechanics

Application of molecular dynamics on the atomistic level and finite element method on the continuum level in concurrent and hierarchical multiscale settings. Speed-up of the information transfer in the multiscale coupling. Researching the choice of the spatial averaging domain in atomistic definitions of continuum quantities (stress, heat flux, etc.).

### Plasticity

Researching the multiplicative and additive approach to thermo-plasticity including the plastic spin concept.

### Paper mechanics

Developing of a complete model capable to describe all aspects of a pulp fibre's material behaviour. Viscoelastic-viscoplastic model, deformation-diffusion coupling for modelling paper curl. Model calibration with data from DMA and AFM experiments.

## Additional academic research achievements

### Award for excellent teaching

**Oct. 2014**

in the category "Young Teachers" – Graz University of Technology, Austria

### Invitation as a lecturer

**Oct. 2016**

on "Statistical Mechanics" at COMMAS Summer School 2016 October 10th-14th at the University of Stuttgart, Germany

### Key researcher

**since Jun. 2017**

in the "CD Laboratory for Fiber Swelling and Paper Performance" at Graz University of Technology

### Approval of grant

**Jun. 2018**

"DST-BMFWF Joint Call for Proposals: India-Austria Scientific & Technological Cooperation Programme" (in cooperation with Assoc.Prof. P. Ghosh, IIT Madras), No. IN 24/2018

### Research guidance

Supervision of 1 successfully completed and 1 ongoing dissertation, supervision of 12 successfully completed and 2 ongoing Master's theses

### Scientific community

Referee for: Applied Mechanics Reviews, Computer Methods in Applied Mechanics and Engineering, International Journal of Solids and Structures, Journal of Mining and Metallurgy - Section B: Metallurgy, Journal of Physical Chemistry, Journal of the Mechanics and Physics of Solids, Modelling and Simulation in Materials Science and Engineering, Technische Mechanik, Soft Matter, Engineering with Computers

## Peer-reviewed journal papers of the last 5 years

1. Loidolt, P., Ulz, M.H., Khinast, J.: Modeling yield properties of compacted powder using a multi-particle finite element model with cohesive contacts. *Powder Technology* **336**, 426 – 440 (2018). doi: 10.1016/j.powtec.2018.06.018
2. Loidolt, P., Ulz, M.H., Khinast, J.: Prediction of the anisotropic mechanical properties of compacted powders. *Powder Technology* **345**, 589 – 600 (2019). doi: 10.1016/j.powtec.2019.01.048
3. Seidlhofer, T., Czibula, C., Teichert, C., Payerl, C., Hirn, U., Ulz, M.H.: A minimal continuum representation of a transverse isotropic viscoelastic pulp fibre based on micromechanical measurements. *Mechanics of Materials* **135**, 149 – 161 (2019). doi: 10.1016/j.mechmat.2019.04.012
4. Ulz, M.H.: A continuum-on-atomistic framework with bi-stable elements for the computation of minimum free energy paths. *Mechanics of Solids* **54**, 975–994 (2019). doi: 10.3103/S0025654419060128
5. Wurm, P., Ulz, M.H.: Demand-based coupling of the scales in concurrent atomistic-to-continuum models at finite temperature. *Journal of the Mechanics and Physics of Solids* **137**, 103,849 (2020). doi: 10.1016/j.jmps.2019.103849
6. Ulz, M.H., Celigoj, C.C.: A uniquely defined multiplicative elasto-plasticity model with orthotropic yield function and plastic spin. *Computer Methods in Applied Mechanics and Engineering* **374**, 113,565 (2021). doi: 10.1016/j.cma.2020.113565
7. Wurm, P., Ulz, M.H.: A hybrid static–dynamic continuum approach for concurrent atomistic-to-continuum methods. *International Journal for Numerical Methods in Engineering* **122**(21), 6405–6424 (2021). doi: 10.1002/nme.6797
8. Seidlhofer, T., Czibula, C., Teichert, C., Hirn, U., Ulz, M.H.: A compressible plasticity model for pulp fibers under transverse load. *Mechanics of Materials* **153**, 103,672 (2021). doi: 10.1016/j.mechmat.2020.103672
9. Seidlhofer, T., Hirn, U., Teichtmeister, S., Ulz, M.H.: Hygro-coupled viscoelastic viscoplastic material model of paper. Under review