



**Summer School
of the
International Research Training Group
(GRK 2078)**

*Integrated Engineering of Continuous-Discontinuous Long
Fiber Reinforced Polymer Structures*

July 6-7, 2016

Scientific Program

Overview on the Schedule of the Summer School

Wednesday, July 6 **Scientific Program Part I** (see page 2-3)

Thursday, July 7 **Scientific Program Part II** (see page 4-5)

Further Information

Scientists and Organizations (see page 6)

Organizers, Location, Contact, Funding (see page 7)

Participants (see page 8-9)

Arrangement of Posters (see page 10-12)





Scientific Program, Wednesday, July 6, 2016

Location: International Department (ID), **Hector Auditorium**, Schlossplatz 19 | 76131 Karlsruhe

Introduction

- 09:00 - 9:10 **Address of Welcome**
Thomas Böhlke, Jeff Wood, Judith Elsner
- 09:10 - 9:30 **Status Quo: Research Training Group GRK 2078**
Thomas Böhlke
- 09:30 - 9:50 **Status Quo: International Composite Research Center (ICRC)**
Jeff Wood
- 09:50 - 10:10 **Status Quo: Fraunhofer Project Centre for Composites Research (FPC@Western)**
Frank Henning

Coffee Break

Plenary Talks

- 10:30 - 11:00 **Aspects of using LS-DYNA for composite simulations in an industrial environment**
Dr. Thomas Münz, DYNAmore GmbH, Stuttgart, Germany
Moderation: Thomas Seelig
- 11:00 - 11:30 **Lightweight design meets eMobility: Electromagnetic Properties of Carbon Fiber Reinforced Plastic Composites in typical Magnetic Fields of Automotive Inductive Charging Systems**
Dipl.-Ing. Michael Holzer, Daimler AG, Ulm, Germany
Moderation: Luise Kärger
- 11:30 - 12:00 **Elevated strain rate loading of composites, hybrid composites, and metallic structures for energy dissipation structural applications**
Prof. William Altenhof, University of Windsor, Canada
Moderation: Kay André Weidenmann

Lunch (ID)



Short Presentations of Selected Research Projects

13:10 – 13:30 **Manufacturing of UPPH based prepreg**

David Bücheler (KIT), Research Area Technology

13:30 - 13:45 **Multi objective patch optimization in combination with draping simulation**

Benedikt Fengler, Luise Kärger (KIT), Research Area Design

13:45 - 14:00 **Mechanical material properties of Co, DiCo and CoDiCoFRP**

Anna Trauth (KIT), Research Area Characterization

14:00 - 14:15 **Biaxial tensile testing and mean field modelling of DiCoFRTS**

Malte Schemmann (KIT), Research Area Simulation

Coffee break**Short Presentations of Selected Research Projects, Poster Session and Discussion**

14:45 - 15:00 **Process chain modeling in GRK 2078**

Konstantin Priesnitz (KIT)

15:00 - 15:15 **Quasi-static and low velocity dynamic characterization of LFT-D compression molded carbon fiber reinforced polyamide-6**

Matt Bondy (Windsor)

15:15 - 15:30 **Simulation of compression molding of direct sheet molding compound**

Atieh Motaghi (Western)

15:30 - 15:45 **Evaluation of class-A surface in SMC composite panels**

Navraj Heer (Western)

Break

16:00 - 16:45 **Poster Session - Part 1**

16:45 - 17:30 **Poster Session - Part 2**

Summer School Feedback

17:30 – 18:00 **Discussion**

Summer School Dinner (ID) (18:30)





Scientific Program, Thursday, July 7, 2016

Location: International Department (ID), **Hector Auditorium**, Schlossplatz 19 | 76131 Karlsruhe

Introduction

09:00 - 09:05 **Opening**

Jeff Wood, Thomas Böhlke

09:05 - 10:35 **Short Presentations of Selected Research Projects (6 x 15 Min.)**

Automated integrated handling and preforming

Woramon Pangboonyanon (KIT)

Quality assurance of CoDiCoFRP with non-destructive testing methods

Marielouise Zaiß (KIT)

The effect of backing roll profile on blade wear during high-volume carbon fiber devering

Evan Freeman-Gibb (Windsor)

Machining of CoDiCoFRTS

Anton Helfrich (KIT)

Dynamic parameter adaption during drilling carbon fiber reinforced composites

Stefan Klotz (KIT)

Tailored reinforcement of PA6 based LFT-D materials using UD tapes

Yuchato Liu (Western)

Coffee Break

11:05 - 12:35 **Short Presentations of Selected Research Projects (6 x 15 Min.)**

3D microstructure characterization from CT images

Pascal Pinter (KIT)

Characterization and modeling of the interface properties of FRP

Michael Schober (KIT)

Thermal properties of glass fiber reinforced polyamide composites during D-LFT-ECM processing

Tom Whitfield (Western)

Simulation and characterization of the DiCoFRP compression molding process

Martin Hohberg (KIT)



Flow-induced anisotropic viscosity model of DiCoFRP*Róbert Bertóti (KIT)***Modeling curing of a thermoset with the phase-field method***Felix Schwab (KIT)***Lunch (ID)**13:15 - 14:30 **Short Presentations of Selected Research Projects (5 x 15 Min.)****A new phenomenological failure model for composite materials from a homogenized micromechanics approach***Shari King (Waterloo)***Homogenization and experimental investigation of DiCoFRP***Loredana Kehrler (KIT)***Development of a new micro mechanics framework for composite materials***Trevor Sabiston (Waterloo)***A new topology optimization method to design DiCoFRP structures***Markus Spadinger (KIT)***Demands on design guidelines for fiber reinforced polymers***Viktoria Butenko (KIT)***Coffee Break (20 Min.)****Group Discussions** (Research Areas (RA): C=Characterization, S=Simulation, T=Technology, D=Design)14:50 - 15:00 **Objectives of the Group Discussions***Moderation: Thomas Böhlke, Jeff Wood*15:00 - 15:20 **Group Discussions: C, S, T and D (each separately)***Moderation: Weidenmann, Seelig, Henning, Kärger, 4 x NN*15:20 - 15:40 **Group Discussions: C+S and T+D***Moderation: Seelig/Kärger, 2x NN*15:40 - 16:00 **Group Discussions: C+T and S+D***Moderation: Weidenmann/Seelig, 2 x NN*16:00 - 16:20 **Group Discussions: C+D and S+T***Moderation: Weidenmann/Henning, 2 x NN*16:20 - 16:50 **Group Discussion: C+S+T+D***Moderation: Thomas Böhlke, Jeff Wood**Summer School Feedback***End of Scientific Program**16:50 – 17:00 **Transfer to Karlsruhe Castle, Meeting Point ID**17:00 – 18:20 **Karlsruhe Castle Sightseeing Tour****(for Canadian Participants and registered KIT members)**



Karlsruhe Institute of Technology



Scientists and Institutions cooperating within the International Research Training Group

(<http://www.grk2078.kit.edu>)

Germany

- **Prof. Dr.-Ing. Thomas Böhlke (spokesperson)**
Institut für Technische Mechanik (ITM) / Institute of Engineering Mechanics (ITM)
- **o. Prof. Dr.-Ing. Dr. h. c. Albert Albers**
Institut für Produktentwicklung (IPEK) / Institute of Product Engineering (IPEK)
- **Prof. Dr.-Ing. Peter Elsner*, PD Dr.-Ing. habil. Kay André Weidenmann**
*Institut für Angewandte Materialien - Werkstoffkunde (IAM-WK), *auch am Fraunhofer-Institut für Chemische Technologie (ICT) / Institute for Applied Materials - Materials Science and Engineering (IAM-WK), *also at Fraunhofer Institute for Chemical Technology (ICT)*
- **Prof. Dr.-Ing. Jürgen Fleischer, Prof. Dr.-Ing. Gisela Lanza, Prof. Dr.-Ing. habil. Volker Schulze**
Institut für Produktionstechnik (wbk) / Institute of Production Science (wbk)
- **Prof. Dr. rer. nat. Peter Gumbsch*, Prof. Dr. rer. nat. Britta Nestler, PD Dr.-Ing. habil. Jörg Hohe****
*Institut für Angewandte Materialien - Computational Materials Science (IAM-CMS), *auch am Fraunhofer Institut für Werkstoffmechanik (IWM), ** nur am IWM / Institute for Applied Materials - Reliability of Components and Systems (IAM-CMS), *also at Fraunhofer Institute for Mechanics of Materials (IWM), **only at IWM*
- **Prof. Dr.-Ing. Frank Henning*, Dr.-Ing. Luise Kärger**
*Institut für Fahrzeugsystemtechnik (FAST), * auch am Fraunhofer Institut für Chemische Technologie (ICT), Universität Western Ontario (UWO) und Fraunhofer Projekt Center (FPC) / Institute of Vehicle System Technology (FAST), *also at Fraunhofer Institute for Chemical Technology (ICT), University of Western Ontario (UWO), and Fraunhofer Project Center (FPC)*
- **Prof. Dr.-Ing. habil. Thomas Seelig**
Institut für Mechanik (IFM) / Institute of Mechanics (IFM)

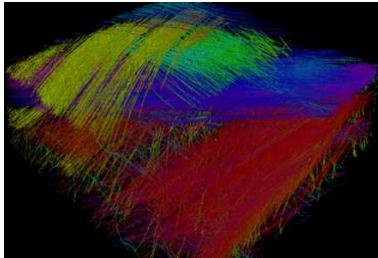
Canada

- **Prof. Dr. Jeffrey T. Wood (spokesperson), Prof. Dr. O. Remus Tutunea-Fatan, Prof. Dr. Andrew Hrymak, Prof. Dr. Colin Denniston, Prof. Dr. Takashi Kuboki**
University of Western Ontario
- **Prof. Dr. Jennifer Johrendt, Prof. Dr. William Altenhof, Prof. Dr. Jill Urbanic**
University of Windsor
- **Prof. Dr. Michael Thompson**
McMaster Manufacturing Research Institute
- **Prof. Dr. Kaan Inal**
University of Waterloo



International Research Training Group (DFG GRK 2078)





Left: Orientation Analysis of a SMC Material (Project C2, Pascal Pinter)

Right: CoFRP structure and final CoDiCoFRP component (Project T1, David Bücheler)

Organizers

International Research Training Group (DFG GRK 2078)

www.grk2078.kit.edu/

Integrated Engineering of Continuous-Discontinuous Long Fiber Reinforced Polymer Structures

Prof. Dr.-Ing. Thomas Böhlke, Speaker

Prof. Dr.-Ing. Frank Henning, Co-Speaker

Location (Scientific Program)

International Department (ID)

www.idschoools.kit.edu

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www.dfg.de

