



Symposium of the International Research Training Group IRTG/ICRG (Summer School 2022)

Integrated Engineering of Continuous-Discontinuous Long Fiber Reinforced Polymer Structures

June 20 - 23, 2022

Location:

**Allgemeines Verfügungsgebäude (AVG), bldg. 50.41,
Adenauerring 20a, room 145/146,
76131 Karlsruhe, Germany**

Contact:

Prof. Dr.-Ing. Thomas Böhlke +49 (0)721 608-48852 (Emergency contact, available at any time)
Dr.-Ing. Loredana Kehrler +49 (0)721 608-48132 (Emergency contact, available at any time)

Contents

Technical Program Overview.....	2
Scientific Program IRTG/ICRG Summer School at AVG	3
Scientists and Institutions Cooperating within IRTG and ICRG	9
Organizers.....	10
Contact	10
Location	11
Funding.....	12



Technical Program Overview

Time	Sun., 19.06.	Mon., 20.06.	Tue., 21.06.	Wed., 22.06.	Thu., 23.06.	Fri., 24.06.	
9:00			Parallel group discussions		Visit of the Helmholtz research center	Individual meetings (self-organized)	
10:00				Workshop			
11:00							
12:00		Lunch		Lunch	Lunch		
13:00							
		Registration					
14:00		Scientific program IRTG/ICRG Summer School	Scientific program IRTG/ICRG Summer School	Scientific program IRTG/ICRG Summer School			
15:00					15:00 Doctoral defense of Juliane Lang		
16:00							
17:00	Informal dinner at Lehnert's Wirtshaus			Summer School dinner			
18:00			Informal get-together				
19:00							
		Welcome reception			Informal dinner		

Further information:

Social event on Sunday, 19.06:

Date	Time	Program
Sun., 19.06.	17:00	Possibility to take part in a dinner (self-paying) at Lehnert's Wirtshaus (Karlstraße 21a, 76133 Karlsruhe)

Online Participation:

- Date: Monday, June 20th to Wednesday, June 22nd, 2022
- Time: 14:00 until the end of the daily program
- Join Zoom-Meeting:
<https://kit-lecture.zoom.us/j/68345448560?pwd=S1NUV29kS1NJa3l6WloyZGI5bEhUQT09>
 Meeting-ID: 683 4544 8560
 Access Key: IRTG_ICRG



Scientific Program IRTG/ICRG Summer School at AVG

Mon., 20.06.2022			
Location	Time	Program	Chair / Presenter
Mensa	12:00 – 13:00	Lunch at Mensa (Canadian researchers)	
AVG, in front of Room (R) 145/146	13:30 – 14:00	Registration and Refreshments	
R 145/146	14:00 – 14:55	Welcome and Introduction	
	14:00 – 14:05	Opening	Böhlke, Wood
	14:05 – 14:15	Opening of the Summer School IRTG/ICRC	Hirth (Vice President of KIT for Innovation and International Affairs)
	14:15 – 14:25	Status Quo of GRK 2078	Böhlke
	14:25 – 14:35	Status Quo of ICRG	Wood
	14:35 – 14:45	UWO/FPC – Challenges and perspectives	Hrymak, Ugresic
	14:45 – 14:55	KIT/ICT – Challenges and perspectives	Henning
R 145/146	14:55 – 16:25	Plenary Talks Part I	Henning
	14:55 – 15:25	Efficient plastic component engineering based on multi-source material data	Kaiser (Robert Bosch GmbH)
	15:25 – 15:55	Next generation SMC-line: CUBE	Bücheler (Schmidt & Heinzmann GmbH & Co. KG)
	15:55 – 16:25	Recent development activities at DYNAmore: How to further enhance predictability	Hauße (DYNAmore GmbH)
In front of R 145/146	16:25 – 16:45	Coffee / Refreshment Break	
R 145/146	16:45 – 18:15	Plenary Talks Part II	Hrymak
	16:45 – 17:15	Composite Materials Research Program at McGill	Hubert
	17:15 – 17:45	Scale transition in solid mechanics with Deep Material Networks	Schneider
	17:45 – 18:15	Bottom-up versus top-down simulations: Traversing length scales from atomistic to macroscopic	Denniston
In front of R 145/146	18:15 – 18:30	Refreshment Break	



R 145/146	18:30 – 19:15	Highlights of GRK 2078 / ICRG	<i>Böhlke</i>
	18:30 – 18:45	GRK 2078: Overview demonstrator/process chain	<i>Schreyer</i>
	18:45 – 19:00	GRK 2078: StartUp project Continuous probabilistic virtual process chain for CoDiCo FRPs	<i>Meyer</i>
	19:00 – 19:15	ICRG: Overview	<i>Hrymak</i>
R 145/146	19:15 – 19:25	Closing	<i>Böhlke, Wood</i>
In front of R 145/146	19:30	Welcome Reception at AVG	

Tue., 21.06.2022			
Location	Time	Program	Chair / Presenter
AVG	9:00 – 10:30	Parallel Group Discussions	
	9:00 – 9:45	Research interactions and joint publications (Part 1)	<i>Pre-session doctoral RA speaker</i>
AVG bridge		• RA Simulation	<i>Summary by doctoral RA speaker</i>
AVG bridge		• RA Characterization	
R 145		• RA Design	
R 146		• RA Technology	
	9:45 – 10:30	Research interactions and joint publications (Part2)	<i>Doctoral RA speaker</i>
AVG bridge		• RA Simulation & RA Characterization	<i>Report of results from previous discussions by doctoral RA speaker</i>
R 145/146		• RA Design & RA Technology	
In front of R 145/146	10:30 – 11:00	Coffee / Refreshment Break	
AVG	11:00 – 12:30	Parallel Group Discussions	
	11:00 – 11:45	Research interactions and joint publications (Part 3)	<i>Doctoral RA speaker</i>
AVG bridge		• RA Simulation & RA Design	<i>Report of results from previous discussions by doctoral RA speaker</i>
R 145/146		• RA Characterization & RA Technology	
	11:45 – 12:30	Research interactions and joint publications (Part 4)	<i>Doctoral RA speaker</i>
AVG bridge		• RA Simulation & RA Technology	<i>Report of results from previous discussions by doctoral RA speaker</i>
R 145/146		• RA Characterization & RA Design	
R 145/146	12:30 – 12:40	Conclusion of Group Discussions	<i>Executive Summary by respective RA speaker</i>
Mensa	12:40 – 13:45	Lunch at Mensa	



R 145/146	13:55 – 14:00	Short introduction to the daily program	<i>Böhlke</i>
R 145/146	14:00 – 15:25	Status Reports: RA Characterization	<i>Weidenmann</i>
	14:00 – 14:10	C1: Characterization and modeling of the interface mechanics in LFRTTP exposed to various environmental conditions	<i>Christ</i>
	14:10 – 14:20	C2: Computational microstructure characterization of FRTTP based on evaluation of imaging procedures	<i>Blarr</i>
	14:20 – 14:30	C3: Macroscopic characterization of CoDico FRPs under influence of different climatic conditions	<i>Scheuring</i>
	14:30 – 14:40	Mode-I DCB testing of an adhesive-bonded thermoplastic fiberglass composite	<i>Zivkovic</i>
	14:40 – 14:50	Fatigue behavior of a unidirectional non-crimp fabric glass fiber reinforced reactive thermoplastic composite	<i>Shi</i>
	14:50 – 15:00	Characterization of carbon/PA66 LFT composites at strain rates ranging from 50 s^{-1} to 200 s^{-1}	<i>Mohammadkhani</i>
	15:00 – 15:10	Fiber distribution characterization and properties prediction of discontinuous-fiber reinforced thermoplastic composites via a data-driven approach	<i>Zhou</i>
	15:10 – 15:25	Discussion	<i>Weidenmann</i>
In front of R 145/146	15:25 – 15:45	Coffee / Refreshment Break	
R 145/146	15:45 – 17:10	Status Reports: RA Simulation	<i>Denniston</i>
	15:45 – 15:55	S1 (2 nd Gen.): Variety of fiber orientation tensors	<i>Bauer</i>
	15:55 – 16:05	S1: Microstructure generation of discontinuous fiber reinforced polymers	<i>Lauff</i>
	16:05 – 16:15	S2: A computational approach to the effective viscosity of fiber suspensions	<i>Sterr</i>
	16:15 – 16:25	S3: Thermoviscoelastic modeling of PA6	<i>Keursten</i>
	16:25 – 16:35	S4: Phase-field modeling of solidification within FRTTPs on microscale	<i>Sarkar</i>
	16:35 – 16:45	Dispersion and orientation patterns in nanorod-infused polymer melts	<i>Afrasiabian</i>
	16:45 – 16:55	3D compression resin transfer molding simulation with fast curing resin for automotive applications	<i>Narayana</i>
	16:55 – 17:10	Discussion	<i>Denniston</i>
In front of R 145/146	17:10 – 17:30	Refreshment Break	



	17:30	Excursion to Turmberg in Durlach (self-paying)	
Entrance of AVG	17:30	Meeting point: entrance of AVG building	
Turmberg (Durlach close to Karlsruhe)	17:56	Tram to Durlach-Turmberg: <ul style="list-style-type: none"> Participants will take the tram together At Durlach-Turmberg Valley Station: <ul style="list-style-type: none"> Cable car to viewing platform Turmberg Stunning view over the city and the surrounding area Possibility to enjoy some snacks and drinks at the bistro (open until 21:00) Payment only with credit card (from EUR 30) or EC card, no cash 	
	21:00	Return to the city: <ul style="list-style-type: none"> 15-minute descent on foot via stairs Tram to Karlsruhe 	

Wed., 22.06.2022			
Location	Time	Program	Chair / Presenter
R 145/146	10:00 – 12:00	Workshop for Doctoral Researchers	
		Continuous-Integration (CI) with Github: Unit Tests with Pytest	<i>Bauer</i>
Mensa	12:00 – 13:30	Lunch at Mensa	
R 145/146	13:55 – 14:00	Short introduction to the daily program	<i>Böhlke</i>
R 145/146	14:00 – 15:05	Status Reports: RA Design	<i>Kärger</i>
	14:00 – 14:10	D1: LFT compression molding simulation	<i>Schreyer</i>
	14:10 – 14:20	D2: Optimization of beaded and ribbed LFT components under consideration of process induced residual stresses	<i>Haberkern</i>
	14:20 – 14:30	D3: Reference System Management: Using research results as reference system elements	<i>Kempf</i>
	14:30 – 14:40	Machine learning methods predicting optimal mechanical properties of carbon-fiber composites	<i>Sears</i>
	14:40 – 14:50	Predicting process parameters for LFT-D for desired mechanical properties	<i>Iskander</i>
	14:50 – 15:05	Discussion	<i>Kärger</i>
In front of R 145/146	15:05 – 15:25	Coffee / Refreshment Break	



R 145/146	15:25 – 16:30	Status Reports: RA Technology	<i>Hrymak</i>
	15:25 – 15:35	T1: Processing fiber reinforced polycarbonate on the LFT-D line	<i>Schelleis</i>
	15:35 – 15:45	T2: Flexible production of reinforcement structures from UD-tapes	<i>Matkovic</i>
	15:45 – 15:55	T3: Towards a multi-material reference body for evaluating the analyzing capability of industrial CT systems	<i>Höger</i>
	15:55 – 16:05	T4: Surface defects during milling FRPs	<i>Böhlend</i>
	16:05 – 16:15	Composite acoustic testing for stationary and moving mediums	<i>Bedrosian</i>
	16:15 – 16:30	Discussion	<i>Hrymak</i>
In front of R 145/146	16:30 – 17:00	Refreshment Break	
	17:00 – 18:30	Networking of Canadian and German Researchers (Parallel Discussions)	
R 145/146		Research visits	<i>Böhlke</i>
AVG bridge		Joint publications	<i>Kärger</i>
R 045/046		Collaboration subjects	<i>Weidenmann</i>
R 145/146	18:30 – 18:45	Conclusion and Closing of Summer School 2022	<i>Böhlke, Wood</i>
Hoepfner Burghof	19:00	Summer School Dinner at Hoepfner Burghof	
	19:00	Meeting point: entrance of AVG building	
	Approx. 19:15	Hoepfner Burghof Restaurant (Haid-und-Neu-Straße 18, 76131 Karlsruhe)	

Thu., 23.06.2022			
Location	Time	Program	Chair / Presenter
Campus North	9:10 – 11:45	Visit of the Helmholtz research center (KIT Campus North) Attention: A FFP2 mask must be worn during the entire tour	
Campus South	9:10	Meeting point: entrance of building 10.23 (ITM)	
	9:30	Shuttle from Campus South to Campus North	
Campus North	9:52	Arrival at Campus North	
FTU, bldg. 101	10:00 – 10:40	Introduction to Helmholtz research center	<i>Börner</i> (Institute of Microstructure Technology)
	10:45	Shuttle to Energy Lab	



SEnSSICC hall	11:00 – 11:45	Visit of Energy Lab 2.0 Smart Energy System Simulation and Control Center	<i>Rubin (Institute for Micro Process Engineering)</i>
	12:05	Shuttle back to Campus South	
Campus South	12:27	Arrival at Campus South	
Mensa	12:45 – 14:00	Lunch at Mensa	
R 145/146	14:45	Meeting point: AVG, room 145/146	
R 145/146	15:00 – 15:30	Public Defense of Doctoral Thesis by Juliane Lang (S2, 2nd IRTG generation)	
In front of R 145/146	16:45 – 17:45	Reception	
Vogelbräu	18:00	Doctoral Defense Celebration at Restaurant Vogelbräu, Karlsruhe	
	17:45	Meeting point: entrance of AVG building	
	18:00	Arrival at Vogelbräu Karlsruhe (Kapellenstraße 50, 76131 Karlsruhe)	

Fri., 24.06.2022			
Location	Time	Program	Chair / Presenter
	9:00 – 16:00	Individual Meetings (self-organized)	
Badisch Brauhaus	18:00	Possibility to take part in a dinner at Badisch Brauhaus (Stephanienstr. 38-40, 76133 Karlsruhe)	



Scientists and Institutions Cooperating within IRTG and ICRG

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

Germany

- **Prof. Dr.-Ing. Thomas Böhlke (Spokesperson), Jun.-Prof. Dr. rer. nat. Matti Schneider**
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* (verstorben / deceased)**
*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. habil. Kay André Weidenmann**
Lehrstuhl für Hybride Werkstoffe am Institut für Materials Resource Management, Augsburg Universität / Chair of Hybrid Composite Materials at the Institute for Materials Resource Management, Augsburg University
- **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. Britta Nestler**
Institut für Angewandte Materialien - Mikrostruktur-Modellierung und Simulation (IAM-MMS) / Institute for Applied Materials - Microstructure Modelling and Simulation (IAM-MMS)
- **Prof. Dr. rer. nat. Peter Gumbsch*, PD Dr.-Ing. habil. Jörg Hohe****
*Institut für Angewandte Materialien - Zuverlässigkeit und Mikrostruktur (IAM-ZM), *auch am Fraunhofer Institut für Werkstoffmechanik (IWM), ** nur am IWM / Institute for Applied Materials - Reliability and Microstructure (IAM-ZM), *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. Colin Denniston, Prof. Dr. Andrew Hrymak, Prof. Dr. Darren Meister, Prof. Dr. Anthony Straatman, Prof. Dr. O. Remus Tutunea-Fatan**
University of Western Ontario
- **Prof. Dr. William Altenhof, Prof. Dr. Jennifer Johrendt, Prof. Dr. Bruce Minaker, Prof. Dr. Jill Urbanic**
University of Windsor
- **Prof. Dr. Michael Thompson**
McMaster Manufacturing Research Institute
- **Prof. Dr. Kaan Inal, Prof. Dr. John Montesano**
University of Waterloo
- **Prof. Dr. Pascal Hubert**
McGill University
- **Prof. Dr. Kamran Behdinin**
University of Toronto



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

Contact

Karlsruhe Institute of Technology (KIT)

www.kit.edu/

Institute of Engineering Mechanics (ITM)

www.itm.kit.edu/cm

Kaiserstraße 10 | 76131 Karlsruhe

Building 10.23, 3rd floor

Prof. Dr.-Ing. Thomas Böhlke +49 (0)721 608-48852 (Emergency contact, available at any time)

Dr.-Ing. Loredana Kehrer +49 (0)721 608-48132 (Emergency contact, available at any time)

Ute Schlumberger-Maas +49 (0)721 608-43796

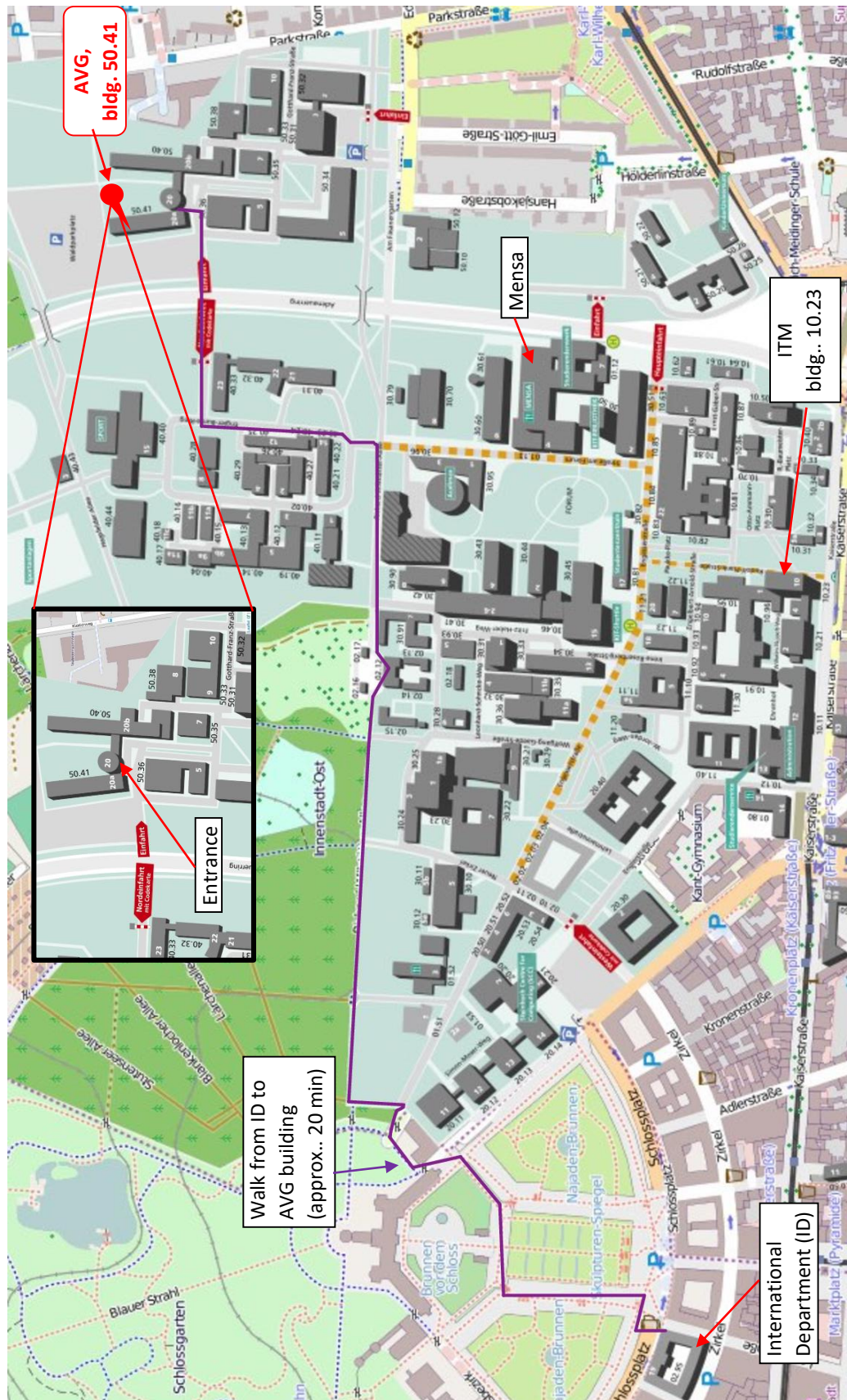
(Office)	Availability:	Monday	09:15 - 17:15
		Tuesday	09:15 - 17:15
		Thursday	09:15 - 17:15

Ariane van Elst (Office) +49 (0)721 608-46107 (available at any time)



Location

Allgemeines Verfügungsgebäude (AVG), bldg. 50.41, Adenauerring 20a, room 145/146



Funding



The funding of the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation), project number 255730231, is gratefully acknowledged. www.dfg.de

