Isogeometric Analysis and Applications

April 7-10, 2014
Annweiler, Germany

Castle Trifels (photo: G. Gaukler/ Leimen, Germany)

Organizing Committee

Bernd Simeon
Bert Jüttler

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Foreword

Isogeometric Analysis is a computational approach that promises the possibility of integrating the finite element method into conventional spline-based CAD design tools. It thus bridges the gap between numerical analysis and geometry, and moreover it allows to tackle new cutting edge applications at the frontiers of research in science and engineering. Two years have passed now since the first International Workshop on Isogeometric Analysis and Applications took place in Linz, Austria. We are very pleased that the scientific community in this field is growing rapidly, which is reflected by the brisk attendance to this second edition of our workshop. With 34 contributed talks, 6 keynote presentations, and with more than 50 participants from all over the world, we are looking forward to a fruitful meeting with lively discussions and new inspiration.

Bernd Simeon & Bert Jüttler   Annweiler, March 2014

Acknowledgements

We are grateful to our sponsors that made it possible to keep the costs for the participants at a minimum level:

- The Fraunhofer Institute for Industrial Mathematics ITWM, Kaiserslautern
- The Center for Mathematical and Computational Modeling CM² at Technische Universität Kaiserslautern
- The Technische Universität Kaiserslautern and its program for equal opportunities

Moreover, we acknowledge the support by the European project TERRIFIC (Towards Enhanced Integration of Design and Production in the Factory of the Future). All technical work packages of TERRIFIC take part at the workshop and present their latest results.

Finally, we wish to thank those that actually took care of all the necessary work to organize this workshop: Monika Bayer from JKU Linz, Anmol Goyal, Doris Hemmer-Kolb, Kirsten Höffler from TU Kaiserslautern, and Jutta Weber from Hotel Trifels.

Accommodation

About half of the participants will stay directly at the **Hotel Trifels,** Kurhausstr. 25, 76855 Annweiler, Germany, Tel: +49 (0) 6346 30 88 60.

Due to limited capacity, the other participants will stay at **Pension Bergterrasse,** Trifelsstr. 8, 76855 Annweiler, Germany, Tel.: +49 (0) 6346 7219. All participants will be notified before their arrival about the place of their accommodation. In the morning and evening, there will be a shuttle service between Pension Bergterrasse and Hotel Trifels.

Lunch and dinner will be served for all participants at Hotel Trifels. All meals as well as one soft drink / water at lunch are included in the conference package. Payment must be made directly at the hotel reception upon departure. Those who stay at the Pension Bergterrasse pay their bill also at the Hotel Trifels.

Accommodation in single room including full board: 101,50 EUR/day

Accommodation in double room, double occupancy including full board: 85,50 EUR/day

For those who have special dietary requirements: At lunch and dinner, there will always be a choice of two dishes, one meat dish and one without (may include eggs or fish). If you prefer to have, e.g., vegan food, please ask the staff at the Hotel Trifels. They will be glad to offer you a special dish.

Travel Information

Annweiler is about 140 km south of Frankfurt and can be reached

- by car in about 90 minutes from Frankfurt airport
- by train in about 2 hours from Frankfurt airport.

A trip planner can be found at the hotel webpage www.kurhaus-trifels.de.

For train connections see www.bahn.de. For those arriving by train, the Hotel Trifels offers a shuttle bus service from the station Annweiler to the hotel and to Pension Bergterrasse. It is also possible to walk from the train station to the hotel and to Pension Bergterrasse, see the map below.
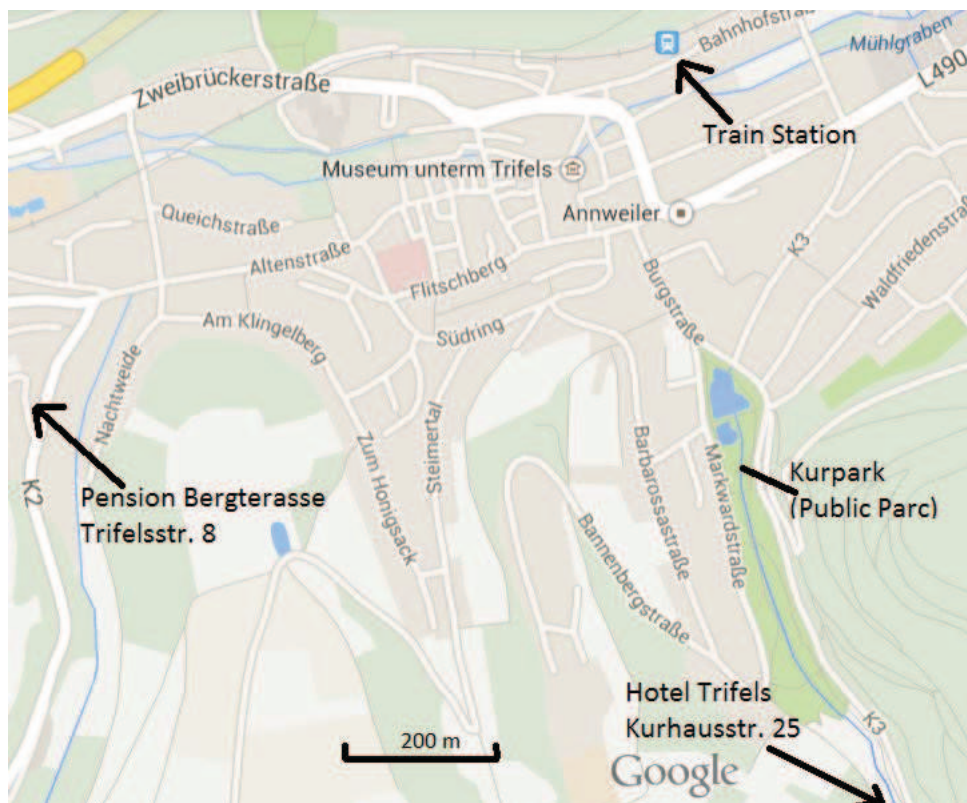
About the Area

The southern Palatinate is an attractive region for nature-lovers, hikers, cyclists, and gourmets of wine. With its diverse scenery, it boasts lovely wineyards, wooded ridges, and rocky mountain tops. Trifels Castle lies just opposite of the Kurhaus Trifels on one of the peaks of a red sandstone mountain.

This castle is famous as the site where King Richard I of England (Richard the Lionheart) was imprisoned after he had been captured by Duke Leopold V of Austria near Vienna in December 1192 on his return from the Third Crusade.

Wednesday, April 9th, we plan to visit Trifels Castle in the afternoon, after a hike of about 1 ½ hours. For those who want to skip the hike, the hotel shuttle bus will provide transportation to the parking area underneath the castle. From there, it is a 10 min. walk to the entrance.

Conference Program

Please note:

- Those speakers who wish to use their own notebook computer are kindly asked to check the connection with the beamer in advance.
- Otherwise, a windows computer with the Adobe Reader is available where you can store and present your PDF document. Additionally, a presenter tool with laser pointer will be provided.
- Contributed talks are 20 min. + 5 min. for discussion
- Keynote presentations are 45 min. + 5 min. for discussion

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Monday, April 07, 2014

Time	Speaker	Title
10:00		Welcome address
10:05-10:55	**Reali**	**Isogeometric collocation methods: An introduction with some applications**
10:55-11:10		Break
11:10-11.35	Cortes	PetIGA: High-Performance Isogeometric Analysis
11:35-12:00	Lovadina	Locking-Free Mixed Collocation Isogeometric Methods for Thin Structures
12:00-14:00		Lunch
14:00-14:25	Bletzinger	Isogeometric shape optimization of 3D shell structures
14:25-14:50	Apostolatos	A penalty formulation for coupling of Kirchhoff-Love shell multi-patches in isogeometric analysis
14:50-15:15	Goyal	Multipatch isogeometric Kirchhoff-Love shells
15:15-15:45		Break
15:45-16:10	Manni	Local Adaptivity in Generalized Spline Spaces
16:10-16:35	Mokris	On the Completeness of Hierarchical Tensor-Product B-splines
16:35-17:00	Wu	Spline Spaces over Quadrangle Meshes and Applications in Isogeometric Analysis
17:00-17:25	Kiss	Adaptive CAD model (re-)construction with THB–splines

Tuesday, April 08, 2014

Time	Speaker	Title
09:00-09:25	Weeger	Isogeometric Finite Element Analysis of Visco-Hyperelastic Nonlinear Structural Vibrations
09:25-09:50	Perl	Higher Order Space and Time Discretizations For Gradient Flows
09:50-10:15	Owens	The Application of Isogeometric Analysis to First-Order Forms of the Neutron Transport Equation
10:15-10:45		Break
10:45-11:35	**Zhang**	**New Advances in Volumetric T-spline Construction**
11:35-12:00	Fußeder	On Shape Optimization in the Context of Isogeometric Analysis
12:00-14:00		Lunch
14:00-14:25	Bouabdallah	Efficient Integration Technique for Isogeometric Elements
14:25-14:50	Coox	Performance of isogeometric analysis for 2D Helmholtz problems: A study of dispersion characteristics, convergence rates and efficient quadrature
14:50-15:15	Tomar	Guaranteed and sharp a posteriori error estimates in isogeometric analysis
15:15-15:45		Break
15:45-16:35	**Langer**	**Discontinuous Galerkin Multipatch Isogeometric Analysis**
16:35-17:00	Toulopoulos	Analysis of Discontinuous Galerkin IGA Approximations to Elliptic Boundary Value Problems
17:00-17:25	Dornisch	A new method for the coupling of non-conforming NURBS surface patches – Theory and comparison to the Lagrange multiplier method.

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Wednesday, April 09, 2014

Time	Speaker	Title
09.00-09:25	Skytt	Discussion on block structured meshes for isogeometric analysis
09:25-09:50	Cavallini	Igatools: an Object Oriented General Purpose Library for Isogeometric Spaces in Scientific Computing.
09:50-10:15	Breitenberger	Realization of an Analysis in Computer Aided Design (AiCAD) Workflow in the CAD software Siemens NX 8.5 using the Isogeometric B-Rep Analysis
10:15-10:45		Break
10:45-11:35	**Hughes**	**Isogeometric Analysis: Where we are and where we are going**
11:35-12:00	Brivadis	Isogeometric variational consistent method for contact problem
12:00-13:30		Lunch
13:30-13:55	De Lorenzis	Recent developments of isogeometric collocation: imposition of Neumann boundary conditions, contact and plasticity formulations
13:55-14:20	Dong	Regularization methods for isogeometric analysis on surfaces
14:20-14:45	Takacs	Scalar and Vector-valued Isogeometric Functions Defined on Surfaces
		EXCURSION

Thursday, April 10, 2014

Time	Speaker	Title
09.00-09:25	Welch	Solutions to Heterogenous Reactor Physics Problems using Isogeometric Analysis
09:25-09:50	Kaklis	Isogeometric Analysis & T-splines for ship-hull optimization
09:50-10:15	Marussig	An Alternative Isogeometric Boundary Element Formulation
10:15-10:45		Break
10:45-11:35	**Kunoth**	**Multilevel Preconditioning for Isogeometric Analysis**
11:35-12:00	Speleers	A symbol-based matrix analysis for isogeometric methods
12:00-14:00		Lunch
14:00-14:25	Roman	Spaces of generalized splines over T-meshes
14:25-14:50	Kim	On the properties of trigonometric generalized T-splines
14:50-15:15	Bracco	Generalized T-splines and T-meshes guaranteeing their linear independence
15:15-15:45		Break
15:45-16:35	**Cirak**	**Multiresolution subdivision surfaces in shape optimisation**
16:35-17:00	Voruganti	Parameterization of Domain through Mapping for Isogeometric Analysis
17:00-17:25	Wawrzinek	Catmull–Clark Limit Surfaces of Minimal Area