



Professor Fabian Duddeck

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<https://www.professoren.tum.de/en/duddeck-fabian>

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Computational Mechanics, Civil, Geo and Environmental Engineering
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Summary:

Professor Duddeck conducts research on the development of numerical methods for the simulation and optimization of structures, focusing on methods for parameter, shape, topology, layout, and material optimization of nonlinear and dynamic problems (acoustics, crash). New approaches for material modeling (composites, biomaterials) and the evaluation of aleatory and epistemic uncertainties (flexibility, robustness, reliability) complement these activities, often in the context of multi-physics and multi-disciplinary applications. Prof. Duddeck studied civil engineering at TUM, earning his Diplom (1990) and Dr.-Ing. in Mechanics (1997) there. After a postdoc period at Ecole Polytechnique/Palaiseau and at TUM, he acquired his postdoctoral teaching qualification (Habilitation) in 2001. He later held an R&D position in industry (BMW) and served as lecturer at TUM. In 2005/6, he served as Reader (Associate Professor) at Queen Mary University of London (QMUL) and as Maître de Conférences at Ecole des Ponts ParisTech (ENPC). In 2010, he was appointed Professor for Computational Mechanics at TUM.

Selected Publications:

Fabian Duddeck, “The Fourier boundary element method and its singularities”, 3rd M.I.T. Conference on Computational Fluid and Solid Mechanics, January 2005

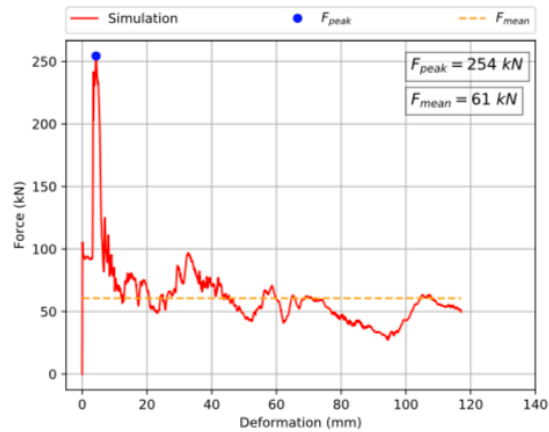


Figure 7: Force-deformation curve with fixed boundary conditions (red); the location of the peak force (blue dot); and the mean force (orange dashed line)

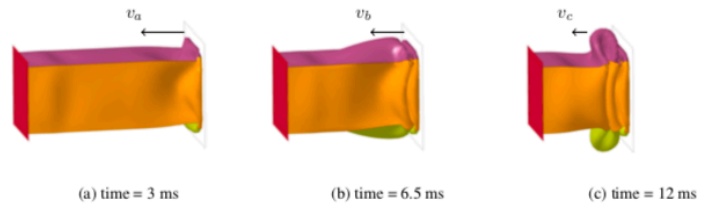


Figure 8: Deformation pattern of the crashbox with deterministic boundary conditions at different time steps

From: C. van Mierlo, L. Burmberger, M. Daub, F. Duddeck, M. Faes and D. Moens “Component-level impact performance assessment under spatially uncertain boundary conditions”, International Conference on Uncertainty in Structural Dynamics, Catholic University of Leuven, Belgium, September 2020

Duddeck F (2008) Multidisciplinary optimization of car bodies. *Struct Multidiscip Optim* 35:375–389

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Volz K, Duddeck F (2012) A new topology optimization approach for crashworthiness of passenger vehicles based on physically defined equivalent static loads. In: *ICrash2012, int crashworthiness conf.* Milano

Zimmermann M, Wölfle F, Zimmer H, Schäfer M, Duddeck F (2012) Subsystem optimization of the vehicle structure for a frontal crash. In: *SIMVEC Conf Berechnung, Simulation und Erprobung im Fahrzeugbau, VDI Berichte*, vol 2169, pp 225–240

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Johannes Fender, Fabian Duddeck and Markus Zimmermann, “On the calibration of simplified vehicle crash models”, *Structural and Multidisciplinary Optimization*, Vol. 49, No. 3, pp 455-469, March 2014

Wehrle E, Han Y, Duddeck F (2015) Topology optimization of transient nonlinear structures—a comparative assessment of methods. In: *10th European LS-DYNA Conference*, Würzburg, Germany

Ilya Arsenyev, Fabian Duddeck and Andreas Flischersworing-Bunk, “Adaptive surrogate-based multi-disciplinary optimization for vane clusters”, Paper GT2015-42164, *Proceedings of the ASME 2015 Turbo Expo: Turbine Technical Conference and Exposition (GT2015)*, Montreal, Canada, June 15-19, 2015

Anna Arsenyeva and Fabian Duddeck, “Efficient and adaptive parametric modeling for shape optimization of a wingbox”, *3rd ECCOMAS Young Investigators Conference and 6th GACM Colloquium*, Aachen, Germany, July 20-23, 2015

S.H. Hesse, A. Arsenyeva, D.H.-F.A. Lukaszewicz and F. Duddeck, “A parameterized surface method to determine optimal variable stiffness layup design by global search”, *20th International Conference on Composite Materials*, Copenhagen, 19-24 July 2015

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Anna L. Arsenyeva and Fabian Duddeck, “Wingbox adaptive parametric modeling and its application to structural optimization”, *Proceedings of the 11th ASMO UK Conference Engineering Design Optimization*, 2016

A.L. Arsenyeva and F. Duddeck, “Optimization of fiber-steered composites by using the iso-contour method with maximum curvature constraint”, *17th European Conference on Composite Materials (ECCM17)*, Munich, Germany, 26-30 June 2016

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Mariusz Bujny, Nikola Aulig, Markus Olhofer and Fabian Duddeck, “Hybrid evolutionary approach for level set topology optimization”, *Proceedings of the IEEE 2016 Congress on Evolutionary Computation (IEEE CEC 2016)*

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L.F. Leidinger, M. Breitenberger, A.M. Bauer, S. Hartmann, R. Vuchner, K.U. Bletzinger, F. Duddeck and L. Song, “Explicit dynamic isogeometric B-Rep analysis of penalty-coupled trimmed NURBS shells”, *Computer Methods in Applied Mechanics and Engineering*, Vol. 351, pp 891-927, 1 July 2019

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