

**“ISOGOMETRIC SHELL ANALYSIS FOR THE MODELING OF
EXTREME EVENTS: FROM ARCHITECTED STRUCTURES TO
LAMINATED COMPOSITES UNDER SHOCK LOADING”**

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ABSTRACT

While Isogeometric Analysis (IGA) has significantly impacted much of computational mechanics, one area that has benefited greatly from IGA research is computational methods for shell structures. Because geometrically complex, smooth surfaces are naturally represented in Computer-Aided Design (CAD) systems, much of that technology could be directly employed in the discretization of existing shell theories, with increased accuracy and robustness in general-purpose nonlinear applications relative to traditional Finite Element Analysis (FEA) representations. In addition, the increased smoothness of CAD surface representation (by means of B-Splines and their rational and unstructured variants) enabled the formulation, and use in general-purpose nonlinear applications, of thin shell theories previously unattainable in traditional FEA. Many more developments followed, making shells some of the most mature of IGA technologies today and a prime candidate for implementation in commercial FEA codes. This presentation will focus on key recent developments in IGA for thin shell structures and show novel applications of IGA to the modeling of architected materials and structures as well as modeling of laminated fiber-reinforced composites in the undersea blast environments.

BIOGRAPHY

Yuri Bazilevs is the E. Paul Sorensen Professor in the School of Engineering at Brown University, where he was the Lead and Executive Committee representative of the Mechanics of Solids and Structures group. Yuri's research interests are in computational mechanics, with emphasis on the modeling and simulation in solids and structures, fluids, and their coupling in HPC environments. For his research contributions Yuri received many awards and honors, including the 2018 Walter E. Huber Research Prize from the ASCE, the 2020 Gustus L. Larson Award from the ASME, and the Computational Mechanics Award from the International Association for Computational Mechanics (IACM). He is included in the lists of Highly Cited Researchers, both in the Engineering (2015-2018) and Computer Science (2014-2019) categories. Yuri recently completed his service as the President of the US Association for Computational Mechanics (USACM) and as the Chairman of the Applied Mechanics Division of the ASME. He currently serves on the US National Committee for Theoretical and Applied Mechanics (USNCTAM), on the Board of Directors of the USACM, and on the executive council of the IACM.