IASS Annual Symposium 2019 – Structural Membranes 2019
Form and Force
7 – 10 October 2019, Barcelona, Spain

Connecting Technical Rigor and Visual Creativity

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Abstract

This paper describes a studio-style project-based graduate course that introduces classic and computational approaches to creating design options for long span structures and tall buildings. The course aims to convey how an iterative design process serves to refine solutions that can be conceptually anticipated using methods such as Graphic Statics or Maxwell Theorem, and validated through numerical analyses. While student teams employ engineering principles to explore relationships between form, geometry, and performance of structural systems, they also reconcile questions about environmental impact, constructability, and visual strength of the designs. Learning from the best examples of built structures develops sensitivity to proportion and elegant structural solutions that merit architectural expression and convey economy of the design through thoughtful use of materials. In addition to structural engineering, students in the course have had a background in architecture, façade engineering, or mechanical engineering; therefore, designs reflect a variety of interests and require effective communication of ideas across disciplines. During field visits and guest lectures students gain additional insight into the engineering rigor and creativity in the real-world structures. Regular interactions and project reviews with practicing engineers emphasize critical analysis and optimizing load paths, structural systems, and details. A common thread in all class activities, inspired by David Billington's scholarship and teaching, is to understand the cultural and economic meaning of efficient forms that can be achieved through creative and disciplined structural design.