Rational Connections in Complex Structures

GCD-seminar   Wednesday **November 8th** 2023 at 11am

Marilies Wedl

on the topic of her PhD thesis: **Rational Connections in Complex Structures**

ABSTRACT

This dissertation project deals with the question of **how to construct complexly shaped, load-bearing architectural structures while keeping connections rational, refined, and simple**. Systematic investigations explore non-standard building structures with novel joint systems, considering its "costs", spanned by the intricate interplay of functional and aesthetic properties relevant to architecture. The design of connections in non-standard, in particular doubly curved structures has long been identified as one of the key challenges of the design process within complex architectural shapes. Connections have the characteristic task of linking single members with each other, which is accompanied with transferring loads of one element to the next leading to complex stress transfer mechanisms. Parallel, the emergence of non-standard architectural shapes calls for structural configurations, where the degree of complexity within one connection is increased additionally as, in general, each node is individual with respect to its local geometry together with specific local load conditions.

Research in Architectural Geometry and Discrete Differential Geometry show, when certain geometrical conditions are met, node complexities within non-standard structures can be rationalized significantly serving as a promising base for economically viable solutions regarding further specifications in materialization, fabrication, and assembly. Hitherto, taking up research, from abstract geometric modelling to elaborated building structures with high degree of development largely remains open.

By **combining theories from Differential- and Discrete Differential Geometry with knowledge in architectural design, structural engineering and actual building practice**, this thesis aims to further develop the "state of the art" in a cross disciplinary approach creating new perspectives on the research problems being posed. The aim is to develop and propose novel approaches to generate elaborated architectural shapes whose structure and logic are inseparably related to the essence of effective connection details and to investigate tectonic structures, where rational connections are considered as critical design driver culminating in the question of "Can a materialized joint detail become the origin of an architectural aesthetic?"

hybrid talk

in **Seminarraum FAV05 (HA0503), 1040, Favoritenstr. 9-11, 5th floor**

as well as online via zoom:

https://tuwien.zoom.us/j/93292744517?pwd=VXA1QThFRDVZWUpRaHZKUHZSaWJwdz09

Meeting ID: 932 9274 4517
Password: 0YEdQ0Zn

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