DAS WEICHE HAUS soft.spaces

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KEYWORDS

minimal surface, membrane, selforganizing prozesses, catenoid, Gaussian curvature,

INTRODUCTION

Prestressed, spatially curved Membrane Structures - developed by Frei Otto and his team at IL- were up to today mainly used for wide span, lightweight-structures.

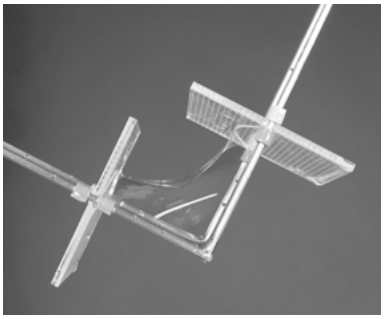
SUBJECT

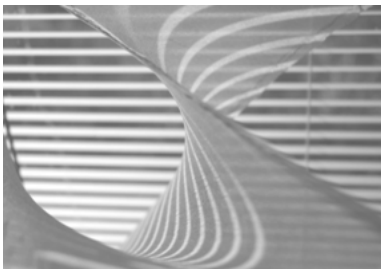
This paper presents the research on anticlastic Minimal-Surfaces that considers the infinite possibilities of membrane forms as new elements in architecture in combination with common building-technologies and shows new capabilities in designing and creating space.

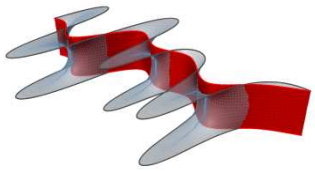
In contrast to the man-controlled process of shaping, forms, arising from selforganizing processes, can only be influenced by the design of their boundaries. The fluent shapes of Minimal-Surfaces are fascinating by their variety, structural performance, reduction to the minimal and their special fashion-resistant esthetics.

OBJECTIVES

To find out about the chances for an architecture between „hard“ and „soft“ morphology, basic research on the systematic determination of very different boundaries -the interface between membranes and common construction-technologies- enable the opportunity to analyze anticlastic Minimal-Surfaces regarding form and curvature.







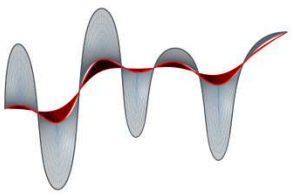


Abb. 01 *Minimalflächen im Vergleich*

Vice versa we get an idea of the correlation between 3d-curvature, deflection and determined boundary and further on an idea of formal and structural behavior.

In this context the assessment and visualization of the Gaussian curvature, which were adapted especially to this research, played an important role.

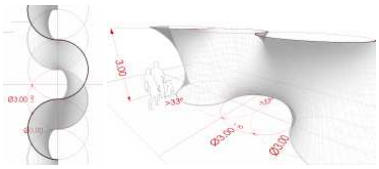


Abb. 02 *Längsverschiebung der Ränder (LV)*

METHODS / RESULTS OF INVESTIGATION

The results of physical, soapfilm and mainly digital experiments show surprising and partly new correlations between form and boundary-proportions and so far unknown rules in the selforganizing processes of Minimal-Surfaces – especially in the field of the Catenoid.
The overview and the comparison of the results as well as the possibility of a targeted selection can now be the basis for creative applications.

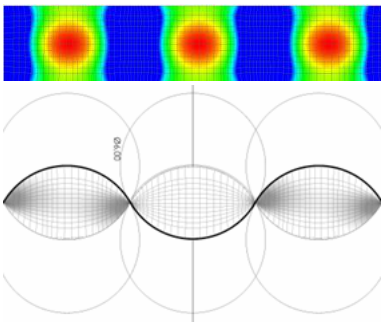


Abb. 03 *Gauß`sche Analyse und Geometrie der Untersuchung EM KK 2/1 _ 0,50HK ggs*

CASE-STUDIES

Case studies give an idea of the infinite possibilities that are open to create very special „soft spaces", with new architectural qualities.

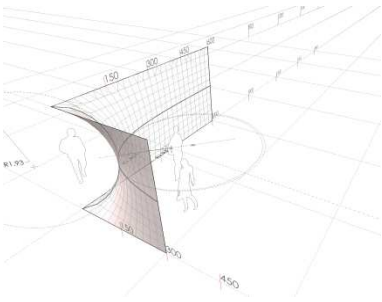


Abb. 04 *Ecke horizontal*

PERSPECTIVE

Latest approaches are dealing with alternative boundary-conditions and with software implementation of found legalities.

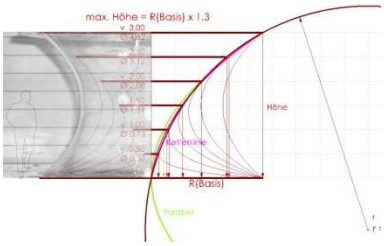


Abb. 05 *Seifenhautversuch und Diagramm zum Katenoid zwischen Kreisringen*

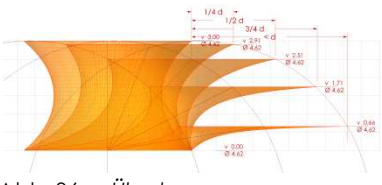
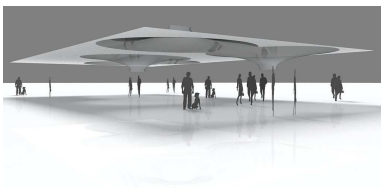
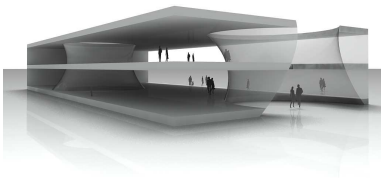
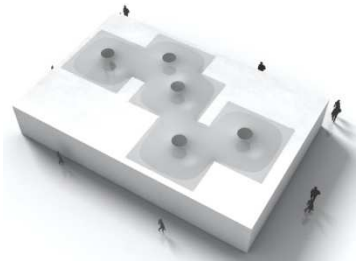
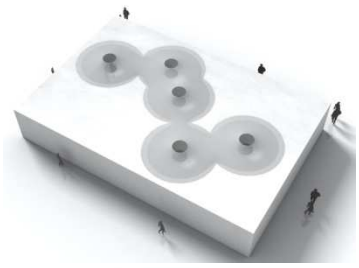


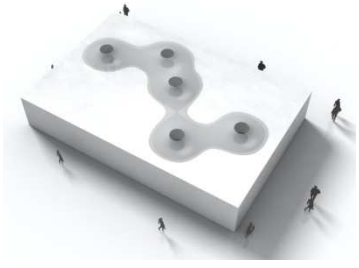
Abb. 06 *Überlagerung verschobener Katenoide.*











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