Universität Stuttgart
Institut für Akustik und Bauphysik

ILEK

Bachelor- / Masterthesis

Analysis and evaluation of light transmission of complementary printed patterns on adaptive membrane cushion constructions.

Background

According to the recently published UN report on the global state of buildings and construction in 2021, the building sector contributes 36 % to global energy consumption. Against this background, Collaborative Research Center 1244 is researching adaptive building envelopes and structures to reduce resource consumption during construction and operation. Membrane cushion structures are considered to be suitable façade constructions because they are very lightweight, recyclable and cover large areas. Using complementary printing patterns over the outermost layers of the foils, it is also possible to provide individual architectural flexibility, media interaction and an adaptive shading effect. For the existing checkerboard pattern, light transmission is reduced as far as the outermost two layers are joined together, and increased by increasing the spacing. But how do novel, inhomogeneous patterns (e.g., stripes) and the parameters they contain (e.g., number and slope of stripes) affect optical comfort, e.g., brightness, glare, and energy input (g-value)? And how broad is this interaction between the closed and open states?

Problem definition

Based on a literature research, new approaches are first derived from existing printing patterns. The question of how a defined pattern can be evaluated is then investigated. Should the adaptation / change of the film layers lead to the strongest or weakest possible interaction? If appropriate, how will other metrics / interactions be affected by this? After the target criterion has been established, it is optimized with regard to the parameters contained in the printing pattern. For this purpose, one of the optimization solvers Galapagos / Opposum is to be used.

Requirements

Ideally, you have previous knowledge and experience in the use of the parametric design tool Rhino3D or are alternatively motivated to deal with it intensively.

Support and contact

Has this announcement aroused your interest? If so, please send us your CV, your current record of achievements and your desired start date. The thesis is available immediately.

WE ARE HAPPY TO ANSWER ANY QUESTIONS AND LOOK FORWARD TO RECEIVING YOUR APPLICATION.

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