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Vortragsankündigung

Seminar Regelungssysteme LV 0430L654

Freitag, 13. Juli 2012, 14:00 Uhr

Vortragort: EN 223

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“Stuttgart SmartShell - Active Vibration Control
of a Double-Curved Shell Structure”

Double-curved shell structures are often used in engineering when large spans without intermediate supports are required, for example in soccer stadiums. They are designed such that they can withstand snow and wind loads that might occur only once in fifty years. This calls for high structural efficiency which is usually accomplished by using large amounts of construction material.

At the University of Stuttgart, we have built an ultra-lightweight shell structure which uses not mass but energy to guarantee structural stability. The Stuttgart SmartShell has a span of more than 14 m it is only 40 mm thick which is 3-4 times thinner than traditional shells of comparable size. It is made of softwood and rests on hydraulic supports which allow for highly dynamic movement and structural stabilisation.



Stuttgart SmartShell (© Bosch Rexroth)

This talk focuses on concepts for active vibration control of the structure which is highly susceptible to wind induced oscillations. A dynamical model is derived from Finite Element simulations and its order is reduced by modal transformation. This leads to a decoupled system description which enables efficient numerical simulation and derivation of control algorithms. A two-degree-of-freedom controller concept is presented and its applicability is shown by experimental results.