Universität Stuttgart

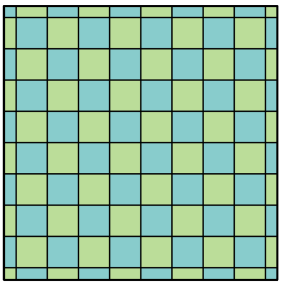
Baustatik und Baudynamik

Master Thesis

Comparison of various tesselations for the stiffening of rectangular plates

Due to a growing awareness regarding resource efficiency, lightweight construction is becoming increasingly important in all areas. Maximizing stiffness with minimum material input is a central goal of lightweight construction in order to ensure optimal use of available resources.

This master's thesis is dedicated to the investigation and comparison of different configurations of downstand beams for stiffening rectangular plates in the context of lightweight construction. In particular, different tesselation are considered as the basis for the configurations of the beams. These tesselation include classical periodic configurations (e.g., platonic, archimedean, ...) and aperiodic configurations. The static deflection and natural frequencies of the resulting rectangular plate configurations are determined using numerical simulations in a commercial finite element program. The results will be compared and are additionally used to answer whether the use of aperiodic stiffeners for stiffening rectangular plates is more efficient compared to classical periodic stiffeners.



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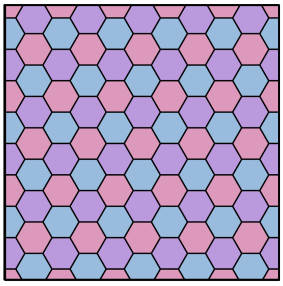

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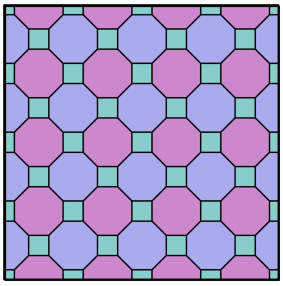

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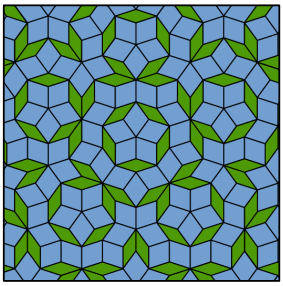

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The specific tasks are

- Literature review on plates and stiffening options.
- Selection of different tesselation patterns as stiffeners for rectangular plates.
- Modeling of the plates with stiffeners in a commercial finite element program.
- Comparison of the numerical results regarding the load-bearing behavior and dynamic behavior of the plates.
- Summary and evaluation of the results.

Recommended fields of interest

Commercial finite element programs, plate structures.

Literature

Grünbaum, B., Shephard, G. C. (1987). *Tilings and patterns*, New York: Freeman, ISBN: 0-7167-1193-1.