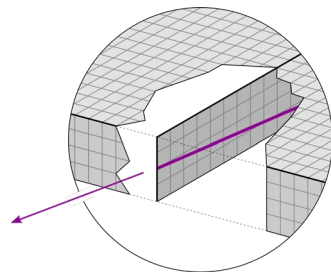
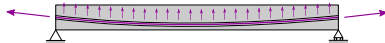
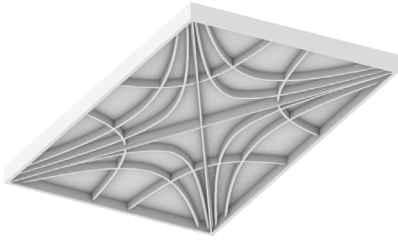


Master's thesis

Design and fabrication of adaptive rib-stiffened floor systems



Floor systems are typically designed to satisfy tight deflection limits under strong out-of-plane loading. While the use of flat slabs is common due to the ease of construction, the load-bearing performance is poor since the material is not optimally distributed within the cross-section to take the bending caused by external loads. This typically results in significant oversizing.

Recent work has shown that rib-stiffened slabs offer significant potential for material savings compared to prismatic slabs. This work investigates the feasibility of adaptive rib-stiffened slabs equipped with a variable post-tensioning system. The post-tensioning system comprises high-strength cables embedded within the concrete rib through a duct that enables varying the cable tension as required. The cables are positioned following a profile so that the tension force is applied eccentrically to the neutral axis of the slab-ribs assembly. The resulting system of forces causes a bending moment and an uplift that counteracts the effect of the external load.

Within the framework of Collaborative Research Centre (CRC) 1244, a full-scale 6 × 10 m prototype of adaptive rib-stiffened slab will be built to validate preliminary findings. The candidate will be expected to contribute the following work packages to complete the experimental agenda on a full-scale prototype: **(1)** detailed design; **(2)** development of digital fabrication strategies; **(3)** response analysis through testing.

Thesis supervision, writing, and examination will be carried out in English.

Contact:

Dr.Eng. habil. Gennaro Senatore
Dr. ès sc. Arka P. Reksowardojo

✉ gennaro.senatore@ilek.uni-stuttgart.de

✉ arka.reksowardojo@ilek.uni-stuttgart.de

Earliest starting date:

01.09.2023

Key requirements:

- Bachelor's degree in civil engineering.
- Good knowledge of finite element modeling (FEM).
- Good knowledge and deep interest in the design and fabrication of concrete structures.
- Proficient in spoken and written English.