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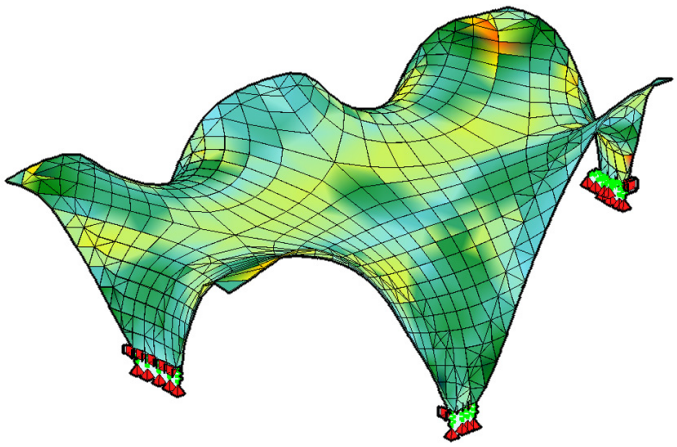
IN COOPERATION WITH
BLOCK RESEARCH GROUP, ETH ZURICH

ANALYSIS OF FERROCEMENT AND TEXTILE REINFORCED CONCRETE FOR SHELL STRUCTURES



Shell structures can be used to create smart, lightweight and rigid structures. Research in minimising the weight and thickness of the concrete shell structures is just on the doorstep of real technological evolution.

Reinforcement for thin concrete shell structures has a long history. Ferrocement, which is the most common reinforcement material for shells, has been a popular method of reinforcing for many decades. Nowadays, researchers are trying to find other ways of reinforcing, for instance with textile reinforced concrete (TRC), which is a woven fabric of carbon or glass fibres. There is a lot of interest in TRC, since it has a high tensile strength and is a very flexible material. In contrast to TRC, ferrocement has a high thermal conductivity, it might corrode and needs more cover. In these applications, a good knowledge of material properties is essential, which is needed to model the shell.

Three reinforcement materials for shell structures will be analysed: ferrocement, glass-fibre textile and carbon-fibre textile. The objective of this study is to compare ferrocement and TRC as a reinforcement material for thin concrete shells. By numerical modelling, it is possible to find a strategy to model the properties as an equivalent material based on the material properties of concrete, weave fibres and steel in TRC and ferrocement. This is done by verifying finite computational element (FE-modelling), with measurements on physical models.

This thesis work is a collaboration with Block Research Group at ETH Zurich (Swiss Federal Institute of Technology Zurich) and the Division of Structural Mechanics at the Faculty of Engineering LTH, Lund University.

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