TECHNOLOGY FOR CONCRETE SHELLS FABRICATION REINFORCED BY GLASS FIBERS

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Fiberconcrete use leads itself to a variety of innovative designs as a result of its many desirable properties. Not only can it be cast in diverse shapes; but it thin –wall structural elements also possesses high compressive strength and stiffness. The promise of thinner and stronger elements, reduced weight and controlled cracking by simply adding fibres is an attractive feature of fibre-reinforced concrete.

Pneumatic mould use is an approach with a set of advantages among thin wall structural element fabrication technologies. In the reported work, on the flat surface of a non- inflated pneumatic mould was imposed and smoothed down (forming a thin layer) glass fiberconcrete mix. Before concrete binding, mould was inflated by air forming a moderate curvature shell. After that concrete was hardened, during concrete hardening air pressure in pneumatic mould was kept constant value. Then an air in the pneumatic mould was blown out and shell was demolded. Two variants were observed: a) shell is reinforced by uniformly distributed short glass fibers (concretes with three different fiber concentrations were investigated); b) shell is reinforced by weft knitted glass fiber textiles (were fabricated in the laboratory). Simultaneously flat material samples were fabricated and experimentally tested. Composite materials elastic moduli as well as tensile strength were obtained. With the goal to predict mechanical behavior of produced thin fiberconcrete shells detailed micromechanical investigation for single fiber and few fibers bundle pull-out micro-mechanics was performed numerically (using FEM modeling) and experimentally. Macro-crack opening structural model, based on data sets with information about single fiber and few fibers bundle pull-out micro-mechanics, (was elaborated earlier) was exploited predicting shell load bearing facility depending on opening of a crack in the loaded shell. Theoretical results were compared with the data obtained in experiments.