**Impact experiments on reinforced concrete specimen – investigation of repeatability and scaling**

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Nowadays, the impact resistance of concrete structures has become a prominent concern for critical infrastructure operators, particularly amidst escalating geopolitical tensions. The regulators and design engineers know that reinforced concrete structures can only be developed with hight efficiency by considering nonlinear structural and highly nonlinear material behaviour. Therefore, specific guidelines on impact design provide instructions for design and analysis of structures required to resist impact loading. These instructions are usually based on published results and evaluated data of impact experiments carried out in laboratories. In order to widen the knowledge and increase the scientific data the Institute of Concrete Structures (IMB) at TUD Dresden University of Technology (TU Dresden) has carried out many impact experiments on reinforced concrete specimens in recent years. A specially designed drop tower is available for this purpose on the premises of the Otto Mohr Laboratory of TU Dresden.

In the framework of the past research at TUD some important issues, such as influence of rebar arrangement, structural thickness, scalability of specimen and repeatability, with regard to experimental impact testing were investigated. This article presents the drop tower facility and research results of impact experiments on reinforced concrete slabs.

First, the scalability of impact experiments will be discussed in conjunction with already known theoretical scaling parameters provided by researchers in the past, e.g. Rüdiger et al. (1982). Scalability of experimental data is of huge importance since protective structures made of reinforced concrete differ usually in size in comparison to experimental specimen. The second important research focus is on repeatably of impact experiments. Since impact experiments are usually time consuming and expensive a certain impact scenario is mostly carried out only once. It is intended to show the range of deviation of impact tests on some already carried out experiments on reinforced concrete slabs. A possible standard deviation is estimated for the applied test setup. In addition, solutions are provided for enhancing structural resistance using strengthening or damping layers. Experimental results demonstrate that both types of developed layers significantly improve the resistance of the underlaying reinforced concrete structure.