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THE ENGINEERING—TOOL *XPLOSIM* TO DETERMINE THE EFFECTS OF EXPLOSIVE LOADING ON REINFORCED AND FIBRE REINFORCED CONCRETE STRUCTURES

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In addition to elaborate and expensive experiments more often numerical simulations have been successfully applied in order to determine the damage effects of explosive loadings on reinforced concrete and fibre reinforced concrete structures. These simulations are carried out e.g. by hydrocodes. For its use, appropriate material models for concrete, fibre reinforced concrete and steel reinforcement are required. They have been developed at our institute at the University of the German Armed Forces Munich.

The damage of a structural member depends on two categories of parameters: first, the parameters of loading, and, second, the parameters of resistance. Essential load parameters are the type, the shape and the mass of the used explosive as well as the distance of the explosive loading to the structure. Essential parameters of resistance are the thickness of the structural member, the characteristics of concrete or fibre reinforced concrete like dynamic strength and density, the bar distance, the bar diameter and the concrete cover.

To determine the influences of the load parameters and the parameters of resistance on the damage of a structural member, its dependencies are investigated and assembled mathematically in so called damage functions. These functions are used for the reliable determination of damage of reinforced concrete and fibre reinforced concrete structures or vice versa for the dimensioning of a structure.

The data is provided in the in house developed engineering—code *XPLOSIM* in the form of an expert software. *XPLOSIM* is based on physical phenomenology and includes the knowledge of numerous parameter studies as well as experimental results obtained from the WTD 52 in Oberjettenberg, and, in addition results from literature. The design of the program is user—friendly, menu—driven and self—explanatory, and, it does not make high demands on hard- and software.