THE REACTION OF THE BUILDING STRUCTURE WITH WINDOW UNIT TO THE EXPLOSIVE IMPACT ON THE BASIS OF DYNAMIC EQUATION SOLUTION

When designing residential buildings, additional measures for increasing the strength at dynamic effects indoors are not foreseen. The walls of the structure fixed in the framework are not designed for shock wave caused by explosion of utility gas. When designing a building, the task of the special dynamic load is often reduced to the calculation of the safe shock pressure, exceeding of which leads to the destruction of the structures. The wall with the window area under dynamic effects is a blast relief panel, which reduces the excess pressure inside the room. The proposed method of calculating a design with a window unit allows determining the dynamic reaction of the wall on explosive pulse. The proposed calculation technique of the constructions at shock loads allows tracing the changes of the inertial forces and displacements at any stage of dynamic response. The reaction to dynamic loads can be also set for non-monolithic structures, consisting of different materials with different conditions of fastening. Elastoplastic reaction of a brick wall with glass units was determined using step-by-step method of linear acceleration. The calculation of stress-strain state of brick walls with window panes determined the strength properties of the structures close to the monolithic version. The proposed technique of numerical solution of dynamic equations is applied only in the analysis of elastic systems, in which the dynamic characteristics remain unchanged throughout the reaction process.

Key words: pulse load, blast relief panel, peak strain, dynamic equation, damper system, numerical solution, elastoplastic state, rigidity, linear acceleration, dynamic factor, explosion load, window unit.

References

About the authors: 
Doronin Fedor Leonidovich — Candidate of Technical Sciences, Associate Professor, Department of Hydraulics and Water Resources, Moscow State University of Civil Engineering (MGSU), 26 Yaroslavskoe shosse, 129337, Moscow, Russian Federation; doronin.fl@yandex.ru;

Trukhanova Lyudmila Nikolaevna — Candidate of Technical Sciences, Associate Professor, Department of Physics, Moscow State University of Civil Engineering (MGSU), 26 Yaroslavskoe shosse, 129337, Moscow, Russian Federation; phystruh@gmail.com;

Fomina Marina Vasilyevna — Candidate of Technical Sciences, Professor, Department of Physics, Moscow State University of Civil Engineering (MGSU), 26 Yaroslavskoe shosse, 129337, Moscow, Russian Federation; fomina1946@gmail.com.