– the boostrap algorithm offers a flexible stochastic analysis method, since it allows the imposition of any specification on the experimental data.

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Numerical analysis of the dynamic loading of elastic-plastic buried structures

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Use of computer technology allows solving of the most complex applied problems, such as dynamic loading of a solid deformable body under the influence of a wide range of external loads (seismic, explosive and others). The study of seismic and explosive impact is based on a series of approximations and models, related to the environment's structure and distribution of the seismic impulse and shock waves in this environment.

For Moldova as priority challenges, we consider environment monitoring and forecasting of changes of environmental parameters, seismic data collection and processing, modelling of seismic waves influence on dangerous constructions.

The problem of computer estimation of operational condition of potentially dangerous objects is very actual for various regions. The potentially dangerous objects are objects where used, stored, transported or destroyed flammable, explosive and toxic substances (oil depots, gas stations, storages of fertilizers, ammunition depots).

Their damage or destruction in the event of seismic impact (or other force majeure) may lead to environmental disasters. Full-scale physical tests in the industry are difficult or expensive; therefore the significance of mathematical modelling increases. The modern computational capabilities allow solving of the above-menti-

oned problems with using numerical algorithms based on finding solutions of complex mathematical physics equations, to take for model creation a lot of information about objects, which interact with each other and with the environment in the model framework.

The possibilities of analytical methods and application of solutions based on physical experiments are quite limited. Researchers are trying to create to precise mathematical models, numerical algorithms and data analysis systems to obtain reliable numerical solutions for more efficient design of constructions. The implementation of these solutions is a complex task because of their large and number of parameters.

For a correct description of the elastic-plastic behaviour of constructions realistic equations of state for construction filling materials and explosives is necessary to use. The behaviour of various materials is described within the equation of state in the form of Mie-Gruneisen [1], taking into account a complex stress-strain behavior of substance.

The system of governing equations describes the motion of elasto-plastic medium under a shock and blast loading. Equations are written in Lagrange coordinates in a two-dimensional setting. In

this case the coordinates are "freezed" -in the medium so that they move and deform along with it [2, 3, 4].
Lagrangian coordinates allow to simulate free and contact boundaries as well as to implement boundary conditions accurately and correctly. The difference scheme proposed by Wilkins [1] but with certain modifications has taken as a basic scheme for solving the governing equations. This scheme is second order and is satisfactory for the problem that under our consideration. The corresponding state equations for the ground, fluid, explosive and detonation products are chosen. The developed methods and algorithms have tested and realized. Planning and execution of numerical experiments with analysis and visualization in graphs and 2D-images have implemented. In the framework of the described model the stress-strain state of buried structures has analyzed. The properties of structural materials, ground and filler have taken into account. The behavior of buried structures under explosive or seismic wave was studied. The influence of the surrounding environment on the deformation structure processes has investigated. The detailed picture of the process of ground, fluid and structure interaction under dynamic loading has obtained.

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Modeling the Plant Effect on Soil Erosion by Water

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Soil erosion, by water agent, is understood as a moving process of a certain quantity of soil particles from a soil surface point to another point. The presence of the plants strongly affect the erosion process, the plant stem interact with the water motion and the roots modify the physico-chemical properties of the soil. To take into account the plant effect we build a model by coupling the Saint-Venant type equations for water dynamics with a Hairsine-Rose type model for soil erosion. In this talk we analyse, analytically and numerically, the sensibility of the model with respect to the plant parameters.

Acknowledgement. *Partially Supported by a grant of Romanian Ministery of Reserach and Innovation, CCCDI-UEFISCDI, project number PN-III-P1-1.2-PCCDI-2017-0721/34PCCDI/2018, within PNCDI III*