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ON METHODS OF ACCOUNTING MILITARY ACTIONS IN METHODS FOR CALCULATING TECHNOGENIC HAZARDS

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This is a work on methods of accounting military actions in the methods for calculating technogenic hazards. It is a continuation of a number of works on the study of technogenic safety using the R function and state space [1–7]. The approach of earlier works was used, in which the assessment of technogenic hazard was carried out using methods of set theory and state space. This paper proposes a methodology in which a superstructure is made over the previous methods, the aim of which is to calculate a certain correction to the solutions obtained by the existing methods. The correction allows us to take into account the impact of military actions on changes in danger of production facilities. You can implement accounting of military actions as follows.It would be more correct to change the algorithm in such a way as to take into account the impact of the damaging factors of enemy combat weapons. However, it is much easier to make amendments to standard threat assessment procedures that do not take into account possible military operations. Briefly, you can take into account military operations:

- constructing a mathematical algorithm that takes into account the factors of means of warfare;
- by constructing a correction to the results of standard procedures for assessing man-made hazards without taking into account military operations.

In case of taking into account corrections to the results of standard procedures, military actions can be taken into account:

1. multiplicatively;
2. additively;
3. in a combined way, that is linear;
4. using a more complex or arbitrary mathematical procedure.

As in [5] mentioned above, the state space approach, operator approach and R function method are used. The example of a dangerous object is also taken from there. The numerical data are the same.

In the case of searching for corrections to calculations, the calculation algorithm can be represented as an operator, in the general case, of an arbitrary structure, which is applied to the vector of hazard criteria, i.e., acts in the space of hazard criteria. In the simplest case, the correction associated with military actions, as already noted, can be taken into account multiplicatively or additively or in a combined linear way. I.e., a linear operator can be applied to the space of hazard criteria. If we imagine everything that has been said more abstractly as a whole, then we need to come to the idea of an operator for accounting military actions, which in the simplest case can be linear, quadratic, in more complex cases, closer to reality, have a more complex form. In general:

$$\vec{a}' = W\left(\vec{a}\right), \tag{1}$$

where $\vec{a}$ is a hazard criteria vector, $\vec{a}'$ is a hazard criteria vector taking into account combat operations, W – combat accounting operator.

Bearing in mind that

$$\vec{a} = E\left(\vec{f}\right), \tag{2}$$

where $\vec{f}$ is the vector of hazard factors corresponding to a dangerous object can be written

$$\vec{a}' = W\left(E\left(\vec{f}\right)\right) \text{ or } \vec{a}' = WE\left(\vec{f}\right) \tag{3}$$

where WE is operator consisting of sequential application of operators W and E.

The most general quadratic case:

$$W(\vec{a}) = W_{gqc} \cdot (\vec{a} \otimes \vec{a}) + W_{glc} \cdot \vec{a} + \vec{b} \tag{4}$$

where $\vec{b}$ is a case of a constant, $\otimes$ is the Kronecker product. Examples of calculations are obtained for the quadratic case.

This work raises more questions than it answers. The difficulty with this approach is in creating linear, quadratic and other coefficient matrices.. Selecting such matrices or finding an algorithm for obtaining them is a difficult task. Although this is a much simpler task than accounting military actions directly in the technogenic hazards of production facilities. One can hope that the issues of creating such matrices will become clearer when setting specific tasks for recording combat operations.

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