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**A SOFTWARE INTEGRATED PACKAGE FOR FORECASTING OF COLLISION
CATASTROPHES**

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ABSTRACT

An integrated software package for monitoring known or just discovered potentially hazardous celestial bodies has been developed. The package is designed to use the results of computations, first of all, by units of civil defense for planning actions in the period before expected catastrophe and after it, in case it happens. The system provides a permanent online contact with the Minor Planet and Comet Center and with a number of Russian observatories. As soon as data on potentially hazardous bodies are updated at the website of the Center they are read and recognized by keywords and then are forwarded to automatic processing. According to all available observations either new preliminary orbit is determined or already known orbit is improved. The accuracy of the orbit is estimated and then prognosis of motion for the next few revolutions of the body around the Sun is fulfilled. When in the course of body's approach with the Earth their mutual distance achieves minimum it is fixed. If the body comes into the Earth's sphere of action the estimation of the collision probability with the Earth is fulfilled when crossing the border of the sphere. A second assessment of the probability of collision is fulfilled at the minimum distance from the Earth if the body passes by the Earth, or at the point of entry into the Earth's atmosphere (100 km above the Earth spheroid). At entry point the uncertainty of the trajectory parameters is evaluated. The calculation of the motion in the atmosphere is fulfilled taking into account its resistance. The altitude and geographical coordinates of a possible explosion in atmosphere, its energy, the region of scattering trajectories depending on the inaccuracy of initial data at entry point and the physical characteristics of the body are calculated. In case of reaching the

Earth's surface the place of the fall is determined, seismic environment at different distances from the epicenter is calculated. Depending on population density in the area of impact and the degree of its urbanization the number of dead, hard and easily wounded in each locality is estimated. Also the required quantitative composition of the medical staff, the composition of the rescue teams and the necessary equipment to conduct rescue and recovery operations are calculated. The amount of food, water, tents, etc. to provide the population in the affected area are computed. The complex provides a special mode of work for education and training of activities of the personnel of different services in the period before the fall, and after it. The complex was tested on several examples (2008 TC3, 2014 AA, Chelyabinsk meteorite etc).