NUMERICAL SIMULATION OF IMPACT CATASTROPHES

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On the basis of numerical modeling the processes of disruption, fragmentation and separation of debris of cosmic bodies of various origin in the dense layers of planetary atmospheres have been considered. A new numerical model proposed is a combination of the model of deformation of continuous media and the discrete Sand Bag model. It allows one to simulate not only disruption of solid bodies such as asteroids and comets, but also evolution of bodies which are initially swarms of debris. The considered range of velocities is 15-50 km/s, sizes of the objects varying from 50 m to 2 km.Calculations of cratering have been conducted using the model of transparent boundary. This model makes possible to observe dynamics of formation of a crater and an ejecta blanket around it taking into account interaction of the ejecta with the strongly perturbed atmosphere. The ejecta is a mixture of vapors and fragments in the condensed state. Mass concentration of these components depends on the internal energy of the medium at the moment of violation of medium's integrity.At modeling of impacts of bodies into water basins such phenomena as formation of a collapsing crater, repeated oscillation of the water surface as well as intrusion of water masses into the neighboring coastal area have been studied. Calculations of impact cosmic catastrophes of planetary scale have been carried out. The dynamics of changes in the form of the surface and internal areas of planets after such events have been investigated.