

MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)  
Science Results from Ground Based Research (4)

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MATHEMATICAL MODELING OF MHD PROCESSES FOR ASTROPHYSICAL OBJECTS IN 3D  
STATEMENT ON MESHES OF HIGH RESOLUTION**Abstract**

The paper presents numerical simulation results of interaction process of Supernova strong shock wave with interstellar molecular cloud. In the present problem statement gravitation, heat conductivity and radiative losses are neglected. The processes of deformation and fragmentation of molecular cloud, formation of passing through and reflected shock wave systems, contraction and ablation of the matter are investigated in detail. The post-processor treatment the results of calculations made it possible to distinguish the following features of the molecular cloud matter: the vortexes formation, erosion and ablation. After the hitting the cloud by the Supernova shock the reflected shock appears and moves upstream, the cloud surface is getting perturbed with the time, the Richtmyer-Meshkov instability begins to develop downstream. The next stage is characterized by expansion of the cloud and formation of complicated wave structure. After the primary shock wave vortexes are formed in time. The ablation process develops at the surface of the cloud. The vortexes form ringlike structure on the cloud surface. Those structures are transformed into vortex streets and initiate formation of the whirlpool studs. Counter rotating neighboring vortexes form primary and secondary systems of vortex structures. These vortex structures are stretched, bended and change their shape in time forming secondary, tertiary structures etc.