0.02SD), 거리지수는 10.6등급(±0.3)으로 측정되었다.

성단의 나이는 대략 $8\times10^6(\pm2\times10^6)$년으로 추정되며 나이분산은 천만년 이내로 추정된다. 이러한 분산은 Herbst & Miller(1982)가 비슷한 나이의 산개성단 NGC 3293의 관측에서 추정한 2천만년정도의 나이분산보다 작은 값이다.

Evolution of a Tidally Disrupted Star by a Massive Black Hole : Development of a Hybrid Scheme of the SPH and TVD Methods

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The evolution of the stellar debris after the disruption by super massive black hole's tidal force is a difficult problem to solve numerically. We developed a hybrid scheme of SPH(Smoothed Particle Hydrodynamics) and TVD(Total Variation Diminishing) in which the SPH particle is used to cover a widely spread debris and the TVD is used to provide a higher resolution calculation near the stream crossing where strong shock occurs. The debris atarts as SPH particles and is mapped onto the TVD grid when entering the TVD box. The outgoing flux at the TVD box boundary is represented by creation of particles at the boundary of the TVD box in such a way that mass, momentum and energy are conserved. Although the mass of newly created particles at the TVD boundary are generally much smaller than the incoming SPH particle mass, it is necessary to create particles at every TVD boundary grid in order for satisfactory energy conservation because of strong gravitational force by the black hole. Time step control between the SPH and TVD schemes and some preliminary results for the evolution of stellar debris using our scheme are presented.

DYNAMICAL IMPLICATION OF THE MOLECULAR CLOUDS IN THE GALACTIC CENTER REGION

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We have studied the response of gaseous disk to a rotating bar by conducting SPH simulations for the Galaxy in order to understand the distribution and kinematics of the Galactic Center molecular clouds. Our models for the Galaxy consist of three axisymmetric components (massive halo represented by the logarithmic potential, exponential disk, a compact bulge represented by a Plummer model) and a non-axisymmetric bar. The models with four different values for bar's axial ratio, 2:1, 2.5:1, 3:1, and 4:1 were considered. An axisymmetric model without the bar was also calculated for comparison. Our simulations clearly show that the orbits of particles are much perturbed by the rotating bar potential, giving rise to some

noticeable features. It is shown that non-circular forbidden components such as l = 3.2° , l = 1.7° , and Sgr E complexes appeared in the HCN l - V map (Lee 1996) can be well fitted by a model with the axial ratio of the bar potential being 2.5:1 and 3:1. The best fitting viewing angle with respect to the bar major axis lies between 40° ~ 50° . These non-circular components in our simulations are two spiral arm components changing abruptly their orbits from x1 to x2 family. Due to the inflow of the gas within CR, the model predicts the apparent void of gas near CR. This result coincides with the observed sparse resion in HCN l - V map. Such sparse resions have been also seen between low velocity and high velocity envelops in CO l - V maps (Bitran 1986). The main reason for the occurrence of the above mentioned structure is identified as the hydrodynamic collisions beyween clouds having non-circular orbits, which were caused by the perturbation of the rotating bar.

Subject headings : The Galaxy : center - clouds : distribution : SPH : dynamics

Revist to the Two-Component Fokker-Plank Models for Dynamical Evolution of Globular Clusters

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The course of dynamical evolution of post-core-collapse globular clusters is determined by many factors such as initial mass function, the nature and efficiency of energy generation mechanisms, tidal cutoff, and stellar evolution. There have been many efforts in developing more and more complex cluster models including such factors, making analysis and interpretation very difficult. However, studying of simpler models could be more instructive in identifying important physical processes governing the evolution. Two-component models (normal star and degenerate star components) are a simplest realization of clusters with initial mass function because the high mass stars quickly evolve off while low mass stars survive for a long time as main-sequence stars. In the present study we examine the entire evolution of globular clusters using such models that includes both tidal capture and three-body binary heating. The post-collapse clusters are characterized by self-similar structure which can be easily scaled with external cluster parameters. We derive simple criteria for the onset of the gravothermal oscillations in two-component model. Because of the simple physics behind the criteria, we predict that the criteria will be the same even for multi-mass models. We also find two-component model parameters which best fit the result of realistic multi-component model so that one can extrapolate our two-component results to observed clusters.