Effects of Tidal Shocks on the Evolution and Evaporation of Globular Cluster

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We have implemented the effects of tidal shocks in multi-component isotropic Fokker-Planck code in order to study evolution of globular clusters in realistic galactic potential. Unlike the previous studies with the first order energy shift term only, we also included the second order dispersive term are incorporated, assuming that the energy gain by each star is quickly isotropiced. The second order term is found to be at least as important as the first order term, The globular clusters begin to expand untul complete evaporation if the initial concentration is low. For relative concentrated clusters, both the core collpase and the stellar evaporation rates are accelerated significantly. We have assumed that the post-collapse evloution is driven by the heating effect of binaries formed via three-body processes. We also discuss the limitation of our approach.

BTSPH with the Individual Timestep Integration

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In order to handle the gasdynamical problems of multiple time scales efficiently, we have introduced the method of individual timesteps into the binary-tree smoothed particle hydrodynamics (BTSPH) code developed by Kim, Hong & Yun(1994). The timestep of each particle, $\triangle t_i$, is adjusted to satisfy

$$\triangle t_i = 2^k \min_j(t_i),\ k=0,1,2,....,\ k_{max},$$

where j runs over all the particles. By doing this we classify the particles into k_{max} time-bins and let the particles of the same time-bin have exactly the same time. For actual time intergration we employed the high order predictor-corrector scheme used in the standard Aarseth's code. This scheme gives much more accurate results than the modified Euler scheme does in the original BTSPH. To test the performance of the modified BTSPH we have run the one dimensional shock tube test, the adiabatic clouds. The results are consistent with the ones done by the original BTSPH. The modification has reduced the CPU time by more than 40 percents.