COMPRESSIVE EFFECTS ON THE GALACTIC GLOBULAR CLUSTERS BY GRAVITATIONAL DISK-SHOCKING

MASAAKI SHIMADA
Department of Astronomy, Kyoto University
Kyoto 606-01, Japan

What is our problem? Observed figures of the Galactic globular clusters are somewhat elliptic in many cases. For not a few clusters (e.g. 23 of 72), the observed ellipticities (Shawl & White 1987) are ≥ 0.1 within $\sim 2r_{\rm h}$. By a series of numerical experiments, we study whether or not tidal force from the Galactic disk can produce the observed ellipticities in such an inner region (Shimada 1996)

Method and Model: We integrate the equations of motion of 10^5 cluster stars. The clusters mean force field is calculated by the SCF method (Hernquist & Ostriker 1992), and the tidal force field is given from a plane parallel disk model. We use three kinds of model orbits of the cluster: 1) single passage through the disk, 2) oscillation around $Z = 0$, and 3) stationary at $Z = 0$. Models 2 and 3 correspond to circular motions around the Galactic center. We draw density contour maps of projected images of the clusters and measure their ellipticities, ϵ.

Results and Concluding Remarks: Although the clusters exhibit $\epsilon > 0.1$ around $r \sim 2r_{\rm h}$ in some cases, $\epsilon < 0.1$ holds at almost all times in an innermost region $r \sim r_{\rm h}$. Therefore, we can conclude that the tidal force from the Galactic disk is not the principal cause of the observed ellipticities of the Galactic globular clusters. The principal cause may be rotation of the clusters (Einsel & Spurzem 1997)

References

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