Chapter 7

Conclusions and future prospects

7.1 Conclusions

The main aim of the thesis has been to carry out some studies concerning the structure and dynamics of triaxial mass models, showing isophotes twists and ellipticity variations and high-order residuals in their projections along a line-of-sight. In the thesis we have considered triaxial mass models of type $A$ and $B$ for our studies. The models $A$ and $B$ are nearly ellipsoidal. The triaxial mass models $A$ have central density cusps, while models $B$ have cores at the center. Both the models $A$ and $B$ show variations in ellipticities and position angles with semi-major axis radius, i.e., isophotes twists, and high order residuals. Thus, these models may be considered as representatives of real galaxies, as the real galaxies also exhibit these features. ZC96 have studied the projected properties of triaxial mass models $A$ and argued that projected properties can be compared with observations of real galaxies for predicting their intrinsic shapes as a function of viewing angles. Following the method established by ZC96, (Chakraborty & Thakur, 2000) have studied the projected properties of $fgh$ version of models $B$. Further, Thakur & Chakraborty, 2001a,b have also tried to put constraints on the intrinsic shapes of considered triaxial mass models photometrically, using the methods of Bayesian statistics. Construction of self-consistent model is very important problem.

The main results of this thesis are summarized below.
• We (Chakraborty & Das, 2002) have studied the projected properties of triaxial mass models \(A\) and \(B\), which are nearly ellipsoidal and have found that the projected properties can be calculated analytically for model \(B\), while for models \(A\) one has to resort to numerical integrations.

• We (Chakraborty & Das, 2002) have found that both the models \(A\) and \(B\) show very interesting properties of high order residuals which was lacking in the previous studies of \(fgh\) models. Depending upon the viewing directions, isophotes are boxy or pointy.

• Small scale variations in profiles of ellipticity can be incorporated by modifying the \(fgh\) models by suitable additional density terms (Das & Chakraborty 2001, Chakraborty \textit{et al.} 2001).

• For cuspy \(fgh\) models (\(\gamma = 1\)), regular orbits exist for quite a large fraction of start-spaces.

7.2 Future prospects

• As a future research programs, we would like to put constraints on three dimensional shapes of real elliptical galaxies using photometric data only (TC01).

• As suggested by TC01, before applying the method of shape estimation to real elliptical galaxies to constrain their three dimensional shapes photometrically, one has to build a large ensemble of models showing ellipticity and position angle of major axis variations with radius, so that the results are insensitive to the choice of models. In this regard we would like to include models \(A\) and \(B\) as ensemble of models showing ellipticity and position angle of major axis variations with radius.

• For models \(A\) and \(B\) we would like to study the correlated projected properties as found for the \(fgh\) models.

• We would also like to find out the distribution of intrinsic shapes of a sample of elliptical galaxies by following the procedure developed by Ryden (1993, 1996).
• We would further like to compare the observed photometric profile of real elliptical galaxies with our model profile, to know the intrinsic shapes of galaxies, as a function of viewing angles.

• We would like to see the effect of fourth harmonic terms on the orbit structure of the models studied here.

• Further, we would also like to see whether self-consistent solutions exist or not for more realistic ellipsoidal triaxial models A and B.

• Finally, as it has been found from the HST observations that black holes are present at the centres of many galaxies, we would like to add black hole at centre of the triaxial mass models under consideration and would like to see its effect on orbits and also on the self consistency of the triaxial models.