Abstract

In this thesis some aspects of the formation, evolution and properties of cataclysmic variables (CVs) formed in star clusters, especially globular clusters (GCs), are investigated. In addition, improvements in initial cluster conditions and binary evolution modelling are considered. The work in this thesis includes numerical modelling of star clusters based on simulations perfomed with the MOCCA code, which intends to provide a better understanding on the effects of dynamics in the formation/evolution of CVs in dense enviroments, as well as to address the so-called "dwarf nova problem", which corresponds to the lack of observed dwarf nova (DN) eruption in GCs, and to explain observed properties of GC CVs. We show that the lack of DN outbursts is actually predicted, irrespective of the model assumptions. In addition, we show that CVs formed in the past 1–2 Gyr are the observed bright and faint population, and their properties strongly depends on the assumed CV evolution model. Even though the main focus are CVs in GCs, we found that the initial binary population properties, as well as binary evolution models, are extremely important in shaping present-day GC CV properties, and should in turn be properly treated in numerical simulation. Said that, we also improved assumptions associated with initial cluster binary populations and binary evolution treatments, which allows us to better predict CV properties. Finally we applied such improvements in the study of 96 updated GC models and, by means of the principle of dynamical equivalence, in the investigation of properties of the Milky Way CV population originated from dissolution of embedded clusters. We showed that the Kroupa initial binary population seems to be a better choice than standard populations usually adopted in star cluster simulations and that low common envelope phase (CEP) efficiency better reproduces observational properties. Additionally, we show that, in the case of realistic model assumptions, bright and faint CVs are mainly formed via CEP under no/weak influence of dynamics and that their spatial distribution can be understood by means of their properties at the pre-CV formation time and at the onset of mass transfer, coupled with GC relaxation times.