Part IX
Pulsating Stars

Throughout this book we have repeatedly considered the stability of stellar layers. A very important aspect of stellar stability is the occurrence of pulsations. Since their periods are determined by the dynamical timescale they are much easier to observe than evolutionary changes of stars, and the periods are very often determined with high precision. Since the recognition that the brightness of *Mira* (o Cet) and other stars is not constant, but varying (semi-)regularly, the interest in stellar pulsations has constantly grown, because it was realized that we can learn about the stellar interior and about the speed of stellar evolution from these pulsations. It has culminated in the field of *helioseismology*, and more recently in its generalization, *asteroseismology*.

In the following chapters we discuss only briefly the basic concepts of the theory of stellar pulsations, which is essentially the problem of solving equations that describe perturbations of a star from its hydrostatic equilibrium on dynamical timescales. The whole field has become so extended and specialised that it requires a separate textbook. We recommend the classical books by Unno et al. (1979) and Cox (1980), but in particular the very recent one by Aerts et al. (2010).