Pulsation and Mass Loss in LPVs

George H. Bowen

Department of Physics & Astronomy,
Iowa State University, Ames, Iowa 50011 U.S.A.

Abstract

The large-amplitude pulsation of long-period variables, together with a number of other interacting processes and phenomena, causes a rich variety of effects on the structure and behavior of the stars. Outflowing winds result, causing extensive mass loss, with profound consequences for stellar evolution. The present status of modeling calculations for LPVs will be discussed first, with various examples. Emphasis will be given to the great importance of complex, nonlinear, time-dependent interactions between things such as the waves and atmospheric shocks that result from pulsation; non-LTE radiative transfer; non-equilibrium chemistry; the growth, changing optical properties, and dynamics of grains; and radiation pressure on both grains and molecules. I will then survey the developing implications and insights from new results and from work now in progress. Some of these concern the structure and the behavior of individual stars (e.g. determination of the pulsation mode and limiting amplitude; properties of more massive stars); some relate to the evolution of individual stars (e.g. evolution of the wind and the mass loss rate; the wind and circumstellar region during helium shell flashes; effects of the star's metallicity); and some relate to the evolution of populations of stars (e.g. the white dwarf mass distribution). All of these, and many more, offer new perspectives and new understanding concerning the character of LPVs and their role in stellar evolution.

https://doi.org/10.1017/S0252921100117300 Published online by Cambridge University Press