Some Aspects of Modelling of Pulsating Atmospheres

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Nonlinear modelling of pulsating stars have two special aspects. Firstly, a self-consistent time-dependent model must include not only the optically thin atmospheric region, but also the large sub-photospheric envelope, which generates the auto-exited oscillations. The physical conditions and spatial scales of these regions are very different, while the accuracy of calculations should be as high as possible, especially of the calculation of periodic radiative shock waves. As show numerical experiments, loss of accuracy in the description of the atmospheric dynamics can strongly affect the motions on the inner matter, and vice versa, to say nothing of the sintetic line spectrum which is one of the main goals of the atmosphere modelling. Secondly, to obtain the attractor (normally the limit cycle) we must run our hydrodynamic model from $\approx 10^2$ to $\approx 10^4$ pulsational cycles, with normally thousands of intermediate models (time steps) per cycle. It is thus clear that one should reasonably simplify the problem of the radiative hydrodynamics if we wish to see the results. In the same time the accuracy must be high enough to obtain physically plausible results. In the present talk I shall describe one of possible approaches to this problem. The talk consists of three parts: Radiative Hydrodynamics of Pulsating Models; Line Profile Modelling; Radiative Shocks in Pulsating Atmosphere.