

Discretized models of radially pulsating stars

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The radial pulsation of stars are self-excited normal modes, but the underlying dynamical system is nonlinear; the excitation arises from the resonant coupling of photon gas to the fluid motion of matter particles. Due to the purely radial movement in pulsation, a model of linearly coupled oscillators in 1D can give pretty reasonable estimates for the characteristics of pulsation in the first approximation.

Applying this model, we have to solve first the derived eigenvalue problem using CPU based routines or algorithms developed for GPU-s. However, improving the models, we have to move further and address the nonlinear dynamical problem with direct integration in time. In this presentation, we illustrate our model computations for linear and non-linear systems on different computing architectures.