A description of the SHELLSPEC program.

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Abstract

Program SHELLSPEC is designed to calculate light curves, spectra and images of interacting binaries and extra-solar planets immersed in a moving gaseous or dusty circumstellar matter (CM). It solves simple radiative transfer along the line of sight in 3D moving media. The Roche model and synthetic spectra from the stellar atmosphere models such as TLUSTY from Ivan Hubeny can be used as a boundary condition for the radiative transfer. The scattered light from the two stars can be taken into account assuming that CM is optically thin. The assumptions include LTE and optional known state quantities and velocity fields in 3D. These can be taken from the 3D hydrodynamic simulations.
Alternatively, optional (non)transparent objects such as: a central star, companion star, envelope, spot, stream, ring, disc, nebula, flow, jet, ufo, or a shell may be defined in 3D and their composite synthetic spectrum calculated. The stars may have either the Roche or spherical geometry, optional velocity or rotation, and may have spots. They are subject to the gravity darkening, limb darkening, and irradiation effect including the heating,reflection and day-night heat redistribution.
Synthetic light curves or trailing spectrograms can be produced bychanging your view points on the 3D object.
A few examples with applications to spectroscopy, Doppler tomography, photometry, and interferometry of binary stars and transiting exoplanets will be presented.

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