General Poster

Impact of an inhomogeneous density distribution on selected observational characteristics of circumstellar disks

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Context. The analysis of observations of circumstellar disks around young stellar objects is often based on models with a smooth and continuous density distribution. However, spatially resolved observations with increasing angular resolution and dynamical models indicate that circumstellar disks are highly structured.
Aims. We investigate the influence of different clumpy density distributions on selected physical properties and observable characteristics of circumstellar disks.
Methods. Based on radiative transfer modelling we calculate the temperature structure of the disk and simulate observational quantities in the thermal re-emission and scattering regime. We compare our results to those obtained for a smooth and continuous density distribution to quantify the influence of clumps on physical parameters and observable quantities of circumstellar disks.
Results. Within the considered model space, the clumpiness has a significant impact on the disk temperature distribution. For instance, in the transition region from the upper disk layers to the disk interior, it causes a decrease of the mean temperature by up to 12 K. In addition, circumstellar disks with clumpy density distributions feature a lower spectral index in the submm/mm range of the SED. As a consequence of the lower spectral index, the dust grain size derived from the submm/mm-slope of the SED may be overestimated, if the inhomogeneity of the disk density distribution is not taken into account. Furthermore, the scattered light brightness distribution of clumpy disks shows a steeper radial decrease. Additionally, clumpy density distributions change the degree of polarization of the scattered light in the optical.