Contribution ID: **59** Type: **Talk**

Discontinuous finite element method applied to the 2D radiative transfer problem in axisymmetric circumstellar envelopes

Tuesday, 7 June 2022 14:20 (20 minutes)

The study of circumstellar environments at different stages of stellar evolution is of crucial importance. These environments reflect the physical processes in action, from the star formation with the presence of accretion discs to late stages in the evolution, in which strong stellar winds shape the circumstellar envelopes. In order to constrain the models describing them, it is necessary to solve the radiative transfer equation under the assumption of radiative equilibrium. We investigated a discontinuous finite element method in order to solve the 2D radiative transfer equation, in spherical coordinates, with isotropic scattering and coupled with the radiative equilibrium equation. The study is conducted for the special case of an axisymmetric circumstellar envelope surrounding a star. We implemented this method in a code and tested its accuracy by comparing it with previous 1D (Ivezic & al. 1997) and 2D (Pascucci & al. 2004) benchmarks tests.

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Session Classification: Protoplanetary Disks

Track Classification: Protoplanetary Disks