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Sculpting the inner edge - themodynamic effects on circumbinay discs

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Binaries carve unique inner cavities into their young surrounding protoplanetary disc. These cavities can be as large and eccentric like GG Tau A. However, with recent observation around tighter binaries like CsCha reveal circular, smaller cavities when compared to the separation of the binary stars. Since similar dynamics carves these cavities, what are we missing when to understand the difference in the shape in these systems? On relevant difference is the heating and cooling in the disc. As viscous heating loses its effect and emission cooling becomes more efficient further out where discs are thinner, the thermodynamic state of the disc changes with distance. In our work, we perform perform 2D hydrodynamic simulations including these thermodynamic effects within the disc. The local cooling time can effect how efficient wave propagate within the disc and, thereby, effect the shape of the circumbinary disc depending on their absolute size. Through those simulations we can explain the observed difference between the inner disc structure self-consistently.

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