

Dust-free modeling of dusty protoplanetary disks

Min-Kai Lin¹
¹ASIAA

Understanding the interaction between gas and dust in protoplanetary disks is important to planet formation from both observational and theoretical perspectives. However, modeling dusty gas dynamics can be challenging, especially when considering small solid particles tightly coupled to the gas. I present a new conceptual approach to study dusty protoplanetary disks, which only requires a slight modification of the usual gas dynamic equations. I demonstrate the applicability and simplicity of this framework by presenting numerical simulations of dusty disk-planet interaction. I show that this model reproduces dust-trapping at gap edges opened by protoplanets --- a phenomenon thought to be relevant to recent observations of protoplanetary disks such as that of HL Tau. I also present a parameter study of how dust-loading affects the gap structure.