Analysis of the instability due to the drag force in dusty protoplanetary discs

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ABSTRACT

We first give a very short review of various mechanisms for the formation of structures in protoplanetary discs. Then we investigate drag force driven instability in dusty protoplanetary discs in the linear regime. We extend previous studies by including multiple dust populations and growth rate of the perturbations is calculated numerically. For a system with two phases dust particles, it is found that the instability becomes stronger. It has important astrophysical implications such as estimating the minimum dust abundance for clumping of dust particles due to this kind of instability. We also discuss about other important physical agents (e.g., magnetic fields) that may affect the instability significantly.