
Fast methods for tracking grain coagulation and ionization

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Abstract

Dust grains play a major role in many astrophysical contexts. Their size-distribution affect the chemical, magnetic, dynamical and optical properties of their environment, especially during star formation. Computing their growth through coagulation is however numerically expensive in hydrodynamical simulations. I will present a novel method that is fast and mathematically exact to track the coagulation of grains without having to compute the Smolukowski equation on-the-fly. I will also present a second fast and accurate method to calculate the ionization of the gas and the average charge of grains. These methods can be used in conjunction to calculate, self-consistently, the non-ideal MHD resistivities in MHD simulations.

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