ALMA Observations of Dust Emission from Protoplanetary Disks : Comparison with Radial Drift Model of Dust Particles

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ALMA observations of protoplanetary disks with high spatial resolution and high sensitivity have made it possible to observe detailed structure statistically and discuss the evolution of gas and dust in the disks, which will lead to our understanding of the formation process of planetary systems.

In this work we have observed 10 T Tauri disks in the Taurus molecular clouds with ALMA. We have analysed the data and compared the results with the theoretical model in which the gas evolution due to turbulent viscosity and the radial drift of dust particles towards the central star due to gas friction are taken into account. The model fits the observations towards 5 objects, and the followings are the tendency of the obtained best fit parameters:

- The initial disk radii are a few hundreds of au.

- The dust parameters A which is related with the Stokes parameter are around 0.1.

- The initial dust surface densities at the disk radius of 1au range from 0.17 to 5.4 g/cm^2.

Meanwhile, the model did not fit the observations towards the remaining 5 objects. It is because the dust surface density profiles are always inversely proportional to the disk radius, and the result suggests that more realistic model in which, for example, the dust size growth is taken into account is needed for further analysis.

Keywords: protoplanetary disks, dust continuum emission, dust evolution

