P213a Gas and Dust Distribution in the Transitional Disk of a Sun-like Young Star, PDS 70

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Protoplanetary disks associated with an inner hole at the center are known as transitional disks and many of them contain a sub-structure so-called an inner disk in the hole. Although the origin and mechanism to maintain its structure are mystery, they are thought to be highly responsible for formation of planets including earth-like rocky planets. We present ALMA 0.87 mm continuum, HCO^+ (J=4–3) emission line, and CO (J=3–2) emission line data of the disk of material around the young Sun-like star PDS 70. These data reveal the existence of the inner disk and a possible two-component transitional disk system with a radial dust gap of about 60 AU and an azimuthal gap as well as two bridge-like features connecting outer and inner disks in the gas data. We simulated the dust disk using the sparse modeling to obtain the image with higher spatial resolution. As a result, a bridge-like structure appears as seen in the gas data, which indicates that the bridge-like feature will probably be detected by high resolution observation. We also discuss the overall structure of the dust disk found from the continuum data and Monte Carlo radiative transfer modeling. The disk seems to have no strong segregation between the dust grain sizes (micron to millimeter) in the outer disk, but the inner disk appears to be devoid of large grains. This is contrary to what is suggested in previous work, but is supported by the large silicate peaks in the SED.