P225a Differential Grain Growth in the Spiral Structure of the LkHα 330 Disk

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Grain growth represents an initial step toward planet formation since it involves the coagulation of approximately micron-sized dust residing in protoplanetary disks around young stars. We have conducted H-band (1.6 μm) linear polarimetric observations and 0.88 mm continuum interferometric observations toward a transitional disk around the LkHα 330. The observations show a pair of asymmetric spiral arms in the disk. We discuss the origin of the spiral arms and suggest that a massive unseen planet is the most plausible explanation based on recent global hydro simulations. The possibility of grain growth causing the asymmetric structure of the spiral arms was investigated through the opacity index (β) by plotting the observed SED slope between 0.88 mm from our SMA observation and 1.3 mm from literature. The results imply that grains are indistinguishable from ISM-like dust in the east side ($\beta \sim 2.0$), but much smaller in the west side ($\beta \sim 0.7$), indicating differential grain growth or dust trapping in the spiral arms. Combining the results of near-infrared and submillimeter observations, it suggests that the disk structures spiral arms from the mid-plane to the upper surface, and that grains grow to millimeter size near the disk mid-plane. Future observations at centimeter wavelengths and differential polarization imaging in other bands (Y to K) with extreme AO imagers are required to understand how large dust grains form and to further explore the dust distribution in the disk.