

Detecting Non-Axisymmetric Structures of Protoplanetary Disks from Low-Resolution Radio Interferometric Data

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We suggest a novel method of detecting non-axisymmetric structures of protoplanetary disks from low-resolution radio interferometric data. We make use of visibility, which are directly observed quantities in interferometry. We show that the asymmetric structures on the plane of the sky shows up as asymmetry in the visibility data in the uv-space. We perform a systematic parameter search of a number of disk models and their simulated observations, and investigate how the disk asymmetric structures appear in the visibility data. We find that the asymmetry of the visibility in the uv-space appears even when the array configuration is not very extended. Even in the case where the asymmetry is indistinguishable in the image on the sky plane due to large beam, it is possible to identify such structures in the uv-space. We have developed a method to identify disks harboring possible asymmetric structures, which may be useful, for example, in archival search.

Keywords: Protoplanetary Disk, Interferometric Observations, Data Analysis