

# 論文審査の結果の要旨

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The thesis consists of three applications of statistical inference to the study of exoplanetary systems.

1. The search for rings around exoplanets by analyzing the light curves of their transits as recorded in Kepler data.
2. Searching for evidence for or against the alignment of protoplanetary disks in 5 nearby star-forming regions.
3. The development of an exoplanet surface mapping technique based on sparse modelling of reflected light.

The work is organized into 6 chapters. Chapter 3 on the search for evidence of rings in light curve data collected by the Kepler space craft is largely reproduced from Masataka Aizawa, Kento Masuda, Hajime Kawahara, Yasushi Suto. “Systematic Search for Rings around Planet Candidates: Constraints on Ring Size and Occurrence Rate”, The Astronomical Journal, 2018. Aizawa is the first author of this peer-reviewed work and responsible for the analysis and results presented in the doctoral thesis.

The search for rings is a null result, but revealed a few interesting (unrelated) properties of some systems which will be looked at in more detail in the future.

The search for planetary disk alignment presented in Chapter 4 originally contained a report of an analysis of the Orion Nebular Cluster which was in conflict with a previous analysis by Eisner et al.. The committee asked him to perform some additional tests to look for a possible bias in his analysis, and in doing so he discovered that phase errors existed in the ALMA data which had not been properly accounted for. There was insufficient time to correct the problem so the results were removed from the thesis. The remaining work continues to show a  $2\sigma$  excess alignment in the Lupus III region, and interesting and original result.

よって本論文は博士（理学）の学位請求論文として合格と認められる。