

Wavefront Sensing for Segmented Mirror Space Telescopes

*Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences,
China*

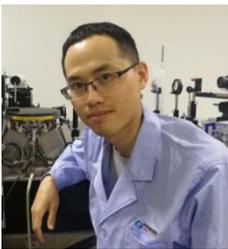
Guohao Ju

Email: juguohao@ciomp.ac.cn

In order to observe more distant and fainter object with a better resolution, space astronomical telescopes with a larger primary mirror are required to improve the limit of diffraction and the quantity of light collected. This leads to problems with optical manufacture and testing, transportation and launch of large monolithic primary mirror. Segmented primary mirrors constitute an efficient solution to deal with the steady increase of primary mirror size. However, the segmented configuration of the primary mirror poses a great challenge to the optical alignment of the system. To achieve a diffraction-limited imaging, the wavefront aberrations induced by cophasing errors of the segments and the global misalignments of the primary and secondary mirrors need to be precisely detected and corrected.

On the other hand, considering that the space borne systems operate in a critical environment, and the system designers are facing significant cost, size, and weight constraints, which mean not all wavefront sensing techniques are suitable for space applications. At present, dispersed Hartmann sensor and phase retrieval are selected as the wavefront sensing techniques for coarse phasing and fine phasing of the James Webb Space Telescope (JWST), respectively. On one hand, we will use similar wavefront sensing techniques for JWST. On the other hand, we will make several important modifications to these techniques to improve the performance of these wavefront sensing techniques.

This talk will present a brief overview of the wavefront sensing techniques used by JWST as well as some ideas to improve the performance of these techniques.



Short Bio:

Guohao Ju is a researcher at the Changchun institute of optics, fine mechanics and physics (CIOMP). He received a bachelor's degree from Jilin University, received a master's degree from Zhejiang University, and received a doctor's degree from CIOMP.

He majors in wavefront sensing and alignment techniques for space astronomical telescopes, especially for those with a segmented primary mirror.