**Numerical study of adaptive optics compensation based on convolutional neural networks**

**基于卷积神经网络的自适应光学补偿的数值研究**

1.在Direct determination中哪里提到该文章

In microscopy, ANNs are beginning to find use in both indirect[23–25] and direct aberration sensing methods[26–28].

2.该文章逻辑是什么

Introduction

目前算法很多，但迭代时间较长，不适合实际应用

人工神经网络的历史

最新的CNN提高了准确性，减少了复杂性及过度拟合的风险

可以实现更高的实时性能

The CNN adaptive optics model

自适应光学概念

卷积神经网络好

The convolution neural network (CNN) model

Data set

对于数据集的设置

Structure of convolution neural network

卷积神经网络的架构

输出示例

Simulation results

训练时间，所需器材

有鲁棒性

对高斯噪声有实用性，但是会随噪声增大降低鲁棒性（利用了无噪声模型）

Conclusions

3.该文章核心是什么？

这篇文章也与Ben的文章很像，不过关注的天文学。它利用卷积神经网络提取了in-focal and out-of-focus图像，用于识别大气涡流导致的Zernike像差叠加。

我关注的是这句话，解释了为什么用一个在焦点图片一个偏离焦点图片的原因，Phase diversity method [9,10] is an improved method based on Gerchberg–Saxton, which key idea is to construct an optimal iterative model to estimate the wavefront phase by using an intensity image in the focal plane and a defocus plane through maximum likelihood estimation.

4.英语表达该文章核心

This article is also similar to Ben's article, but focuses on astronomy. It uses convolutional neural networks to extract in-focal and out-of-focus images, which are used to identify superposition of Zernike aberrations caused by atmospheric vortices.