
Improved Pyramid Wavefront Sensor using a Diffractive Optical Layer

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Abstract

We propose to design an optical preconditioner using an End-to-End approach to improve the linear response of the pyramid wavefront sensor (PyWFS). We added an optical diffractive layer into a relayed Fourier plane and design it using a joint optimization approach with the goal to enlarge the linearity range of the modified PyWFS linear estimation. Simulation results show a notorious improvement at different turbulence profiles, providing with the additional benefit of obtaining equivalent results to the traditional PyWFS but with lower modulation requirements, thus also improving the sensitivity of the novel proposed approach. We are currently working on the experimental demonstration in the PULPOS optical bench using the digital implementation of the PyWFS using a phase-only spatial light modulator.

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