
Comparison of transmissive and reflective SLMs for the emulation of discontinuous wavefronts

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Abstract

It has been known for some time that the Low Wind Effect (LWE) has the potential to severely limit the quality of images obtained using adaptive optics on ELTs. This effect and ways to measure the resulting piston between ‘petals’ of the telescope pupil is an active area of research, relying mostly on numerical simulations, and also laboratory experiments using reflective spatial light modulators (SLMs). In the work presented here we investigate using a transmissive SLM to simulate the petaling effect. This type of SLM is very easy to incorporate into an experimental setup, and has a lower cost than reflective SLMs. The fact that transmissive SLMs are thicker (for the same simulated wavefront error) and therefore slower is not so important for this application. We describe a laboratory setup to demonstrate petaling, including a simple interferometric technique to measure the piston errors. The ability of transmissive and reflective SLMs to generate discontinuous wavefronts is examined and compared.

Keywords: Spatial light modulators, discontinuous wavefronts, reflective SLM, transmissive SLM, wavefront petalling, petal

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