

# Study on beam propagation through a double-adaptive-optics optical system in turbulent atmosphere

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**Abstract** Beam propagation through a double-adaptive-optics optical system in turbulent atmosphere has been investigated. A typical model of optical systems with the double-adaptive-optics configuration is established, principles of the two adaptive optics and theory of beam propagation through the optical system in turbulent atmosphere are analyzed. Power efficiency and beam quality (*BPF*) of the received beam are introduced to evaluate performance of the optical system. Under the H-V 5/7 turbulent model, influences of the two adaptive optics installations are numerically calculated, respectively. Results show that the adaptive optics at the launcher can improve both power efficiency and beam quality of the received beam, the adaptive optics at the receiver can significantly improve beam quality of the received beam. Evolution of the system performance with the increase of adaptive optics correction order is numerically simulated, and results show that the double-adaptive-optics configuration has great advantages in improving beam quality of the received beam in optical systems with beam long-distance propagation through the turbulent atmosphere.

**Keywords** Beam propagation · Optical system · The double-adaptive-optics configuration · Turbulent atmosphere

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