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Introduction

This volume contains the papers submitted and accepted as full manuscripts following presentation at the Eighth Free Space Laser Communications Conference. Free space optical (FSO) communication is now a mature field, but many exciting fundamental and technological challenges remain to improve its performance in a range of scenarios. Short range FSO systems are widely deployed and are available commercially. The performance of communication networks containing such links in addition to directional and omnidirectional RF connections continues, however, to present research challenges. Military applications of FSO technology involving long range links, with mobile and airborne platforms, remains an area of active research and development. Very long range terrestrial links through the atmosphere can experience severe scintillation caused by atmospheric turbulence, which presents significant challenges in beam pointing and leads to deep fades. Clock synchronization is difficult to maintain in the face of these disturbances. An open question remains as to how much the performance of FSO links can be improved with adaptive optics, and how these improvements depend on the length of the link. The performance of free space links can also be improved by forward error correction and packet-level correction codes. Clever transceiver implementations and the right modulation schemes can also improve link performance. All these issues are addressed in papers published in this volume. Ground to satellite, satellite-to-satellite, and deep space optical communications present their own challenges, which are also discussed. The use of FSO communications in indoor spaces over short ranges is attracting attention as a non-interfering alternative to RF communications, and several papers address this important area of research and development. At a fundamental level, several papers address measurement of the effects of the atmosphere on propagating beam waves, where atmospheric properties can be measured, and correlated with theoretical models describing phenomena such as beam wander, scintillation and correlation functions.

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