Paper ID: 21209
student

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Poster Session (P)

Author: Mr. Jack Yeh
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, jack.yeh@spacegeneration.org

Dr. Ramon Mata Calvo
German Aerospace Center, Germany, Ramon.MataCalvo@dlr.de
Mr. Joachim Horwath
Germany, joachim.horwath@dlr.de
Mr. Florian Moll
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, florian.moll@dlr.de
Dr. Dirk Giggenbach
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, Dirk.giggenbach@dlr.de
Mr. Kevin Shortt
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, kevin.shortt77@googlemail.com
Mr. Christian Fuchs
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, christian.fuchs@dlr.de
Mr. Christopher Schmidt
Germany, christopher.schmidt@dlr.de

ATMOSPHERIC TURBULENCE CHARACTERISATION OF FREE-SPACE OPTICAL DOWNLINKS FROM A MOBILE AERONAUTICAL PLATFORM

Abstract

Recent years have seen the profound developments in the field of free-space optical communications on mobile platforms. Optical frequencies facilitates data rates comparable to fiber-optic communications and offer advantages over radio frequency regimes including power efficiency, weight and size. However, both satellite and aeronautical downlinks alike are subjected to the effects of atmospheric turbulence which limits the qualitative value of data. Current research lacks a satisfactory database of channel measurements and hence a profoundly verified channel model for such scenarios. In order to get a better understanding of the atmospheric turbulent channel, atmospheric measurements from an aircraft platform were carried on by the Optical Communications Group at DLR in June 2013. The DLR Optical Ground Station (OGS) measurement setup is constituted by a pupil camera, a focus camera, a Shack-Hartmann sensor and three power sensors. This paper presents the measurement setup, including the synchronization between the involved instruments and investigates the turbulence effects for aeronautical downlinks. The key parameters of atmospheric turbulence are estimated using theoretical models and related with a space scenario. The first analysis of the pupil camera results are also presented.