

SOME CONTRIBUTIONS TO THE IMAGE ANALYSIS IN AMBIENT PERTURBATIONS BY USING AN INTEGRATED VIDEO SENSORS SYSTEM

Catalin SPULBER¹

Abstract. *The paper presents a fast evaluation method for the true performances of an integrated video sensors system. The principle of the proposed method is based on the analysis of main index of the images acquired using mechanical vibrations simulations. It is assumed that the assessment of an EO/IR sensor system performance can be known in poor mechanical ambient conditions, where the mechanical vibrations have an essential contribution. It has been hypothesized (proven during the work) that the modulation transfer function for two integrated video sensor systems (more neatly mounted or less precise) differ slightly in laboratory conditions, but there are significant differences in severe ambient conditions*

Keywords: Atmospheric turbulence, mechanical random vibrations, histogram, image quality, Electro-Optical/Infra-Red system, image simulation, Modulation Transfer Function

1. Introduction

An integrated video sensors system is an Electro-Optical/Infrared (EO/IR) system which aims to provide the detection, the recognition or the identification (as performance index) of an object of interest during the day or the night, sometime fusing the information from the images acquired by each of their afferent subsystems. The most commonly used sensors are CCD cameras / CMOS (EO) and thermal cameras (IR).

The detection of an object of interest is very much influenced by mechanical vibration from ambient, as shown in the graphic simulation from fig.1 using MAVIISS 1.5 [1] and NVThermIP 2009 software [2].

For the case of two EO/IR systems with the same architecture and the same performances of its components, but in which one system has a less accurate montage, the index of the picture quality is different (for example the Modulation Transfer Function, abr.MTF); as a consequence, the observation distances differ substantially if both systems are disturbed from the ambient (Figure 1).

It is very important to assess the effectiveness of an EO/IR system in different conditions of use, especially in those conditions where the possible threats are present and the ambient limits their operability.

¹S.C. Institutul de Optoelectronica S.A, full member of the Academy of Romanian Scientists, (www.aosromania.ro, catalin.spulber@yahoo.com).