Approaches to registration and processing laser ray reflection data in seismic monitoring of city buildings

S Bratarchuk[1*], Z Potilicina[2]

[1]*Institute of Aeronautics, Riga Technical University, Lomonosova st. 1A, k-1, Riga, LV-1003, Latvia*

[2] *SIA "Progmeistars", Pulkveža Brieža 6-1, Riga, LV-1010, Latvia*

**Corresponding author's e-mail: sergey.bratarchuk@gmail.com*

Abstract

Seismic monitoring of buildings is important to avoid collapses, especially in old cities or in cities that are located in the areas of high seismic activity, where the probability of collision is the highest. During the research, vibration data acquisition system that gets vibration data from building reflective surface was made. The main result is creation of working physical data recording prototype and vibration data processing software that is based on computer vision methods. Because of the simple and convenient structure, any researcher can use the created acquisition and processing systems to develop city infrastructure or for their own needs..

Keywords: seismic monitoring, elastic waves, reflective surfaces, computer vision

1 General

The main goal of this study is to: improve seismic process analysis methology. Getting seismic data sometimes is vital; it is possible to save a lot of lives, by predicting mudslides, volcanic eruptions and collapse of buildings with the help of seismic data received. Despite the high level of development of modern seismological equipment, such as: accelerometers, geophones and seismometers, they have common problems which complicate their use, [1] for example: device price, device usage complexity and device limits.

We show that by using irregural-shaped light spot coordinates from the video stream, it is possible without the mechanical contact with the object of the research to get the seismic waveform. Light spot position can be captured, despite the fact that the spot does not have the convex edges (Figure 1), and in every frame the shape of the spot can be different. The produced data acquisition and data processing systems can be used in seismic experiments, by getting data without mechanical contact with an object.

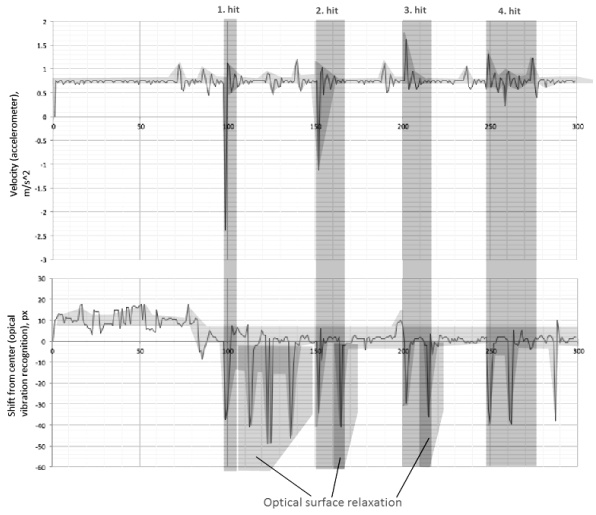

FIGURE 1 Verification of optical vibration recognition with using piezo accelerometer

References

[2] Cornet F H 2015 *Elements of Crustal Geomechanics* Padstow: TJ International

[3] Kroto H W, Fischer J E, Cox D E 1993 *The Fullerenes* Pergamon: Oxford