EXPERIMENT 4
PHOTOGRAMMETRY FOR DISPLACEMENT MEASUREMENT

OBJECTIVES

This experiment aims to use the photogrammetry technique to measure structural deflections in non-contact manner. Photogrammetry technique relies on image capturing and processing to measure real-life displacements.

EXPERIMENTAL METHODOLOGY

The experimental setup is shown in Fig. 1. It consists of a simply supported aluminium beam which acts as the structure undergoing deflections. A stationary reference frame with two markings **A** and **B**, 100 mm apart, is fixed above the beam and not having any connection with the beam. A moving reference **C** is attached to the beam at the mid-point. The beam is loaded at by applying load at the mid-point, resulting in deflection. Simultaneously the photographs of the set-up are captured, both in the original position as well as after undergoing deflection.
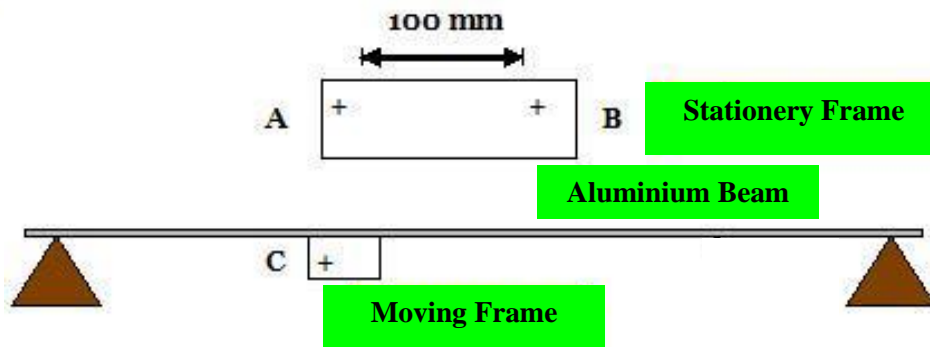

Fig. 1 Experimental set up

The photographs can be analysed for deflections using MS paint, MS word, ADOBE Photoshop or MATLAB. The pixel count of the normal drawn from C to AB can be used to determine the vertical deflections of C in mm, using the principle of proportioning and making use of the fact that the real distance between points A and B is 100 mm. If using MATLAB, following commands can be used

$$I = imread('filename') \tag{1}$$

$$Imshow(I) \tag{2}$$

The concept can be extended to structural dynamics problems also by capturing pictures at a very small interval, say one hundredth of a second, and analyzing them using the computer.

REFERENCES

1. Jauregui, D. V., White, K. R., Woodward, C. B., Leitch, K. R. (2003), "Noncontact Photogrammetric Measurement of Vertical Bridge Deflection", Journal of Bridge Engineering, ASCE, Vol. 8, No. 4, pp. 212-222.

2. Setia, A. (2010) "Photogrammetry for Non-Contact Measurement of Deflection", Department of Civil Engineering, IIT Delhi. http://web.iitd.ac.in/~sbhalla/thesispdf/setia.pdf