265_Experimental Analsyis of Free-Vibration Cracks in RCC Beam

CERTIFICATE

JCON 2019

International Conference on Emerging Trends In Engineering & Sciences (ICETES)

www.icetes.in

26th and 27th February 2019

Savitribai Phule Pune University

This is to certify that Mr. chougale J.B.

has Participated and presented paper entitled Experimentally Analysis of free vibration cracked R.C.C. Beam *in International Conference on Emerging Trends In Engineering & Sciences (ICETES) held at Jaihind College of Engineering, Kuran on 26th / 27th Feb. 2019.*

Dr. R. M. Mulajkar
Convener

Dr. V. M. Dhede
Convener

Dr. D. J. Garkal
Principal

JAIHIND COLLEGE OF ENGINEERING

B++ NAAC

Approved by : AICTE New Delhi & DTE M.S. (Mumbai)
AN ISO 9001:2015 QMS CERTIFIED INSTITUTE
AN ISO 14001:2004 EMS CERTIFIED INSTITUTE & Accredited by NAAC
A/P- Kuran, Tal. Junnar, Dist. Pune- 410 511. • Website- www.jaihind.edu.in

YaShiKa PUBLICATIONS

Experimentally Analysis of Free Vibration Cracked R.C.C Beam

Mrs. Meena Bhagat[1]
[1]Assistant Professor, Department of Civil Engineering,
VIVA Institute of Technology, Virar, India
e-mail: bhagatmeena83@gmail.com

Mr. Chougale J.B[2]
[2]Assistant Professor, Department of Civil Engineering,
VCET Vasai, India,
e-mail: chougale.jay84@gmail.com

Mr. Shashikant M.Nagargoje[3]
[3]Assistant Professor, Department of Civil Engineering, JCOE Kuran, India,
e-mail: goje.shashi@gmail.com

Abstract—
In the present era, health of the structure is of great concern to avoid further hazards caused by deterioration of the structure. So due importance should be given to health aspect of a structure because health defines the long term performance of the structure. Health monitoring is the detection of the overall health of a structure, which includes cracking, spalling of concrete and anything which disturbs the utility of the structure. Many researchers are engaged in detection of cracks with the help of vibration analysis. This method of detection of cracks has been considered as an cost effective and reliable method of health monitoring. The effect of crack location and depth of crack on the natural frequencies and mode shapes has been reviewed in this paper.

The type of crack, its location and depth are the main governing parameters in this study and result parameters are mode shapes and frequencies. The experiment is performed on test beams by using fast forrier analyser, accelerometer and hammer. Validation of experimental results will be done by SAP 2000.

Keywords: Cracks, Free vibration, Frequencies, Mode shapes.

1. INTRODUCTION

Cracks are the most neglected type of damage that is caused to the structure. Many a times in our day to day life we neglect the existence of the cracks in our structure. But as a prominent civil engineer any crack however small may be can cause serious damage to the structure so it should not be neglected. These cracks disturbs the utility and life span of the structure. Cracks develop from flaws due to components like beams, columns, etc. will bear damage due to its long term use. Hence it becomes important to determine the damage characteristics on the structures. Cracks causes changes in the physical properties of a structure which eventually alters its dynamic response characteristics. To detect these cracks inexpensive methods should be found out. Vibration analysis is one of those method in which researchers are focusing on the changes of modal parameters like natural frequencies, mode shapes and modal damping values. The health of the structure should be monitored in an economical way. Using vibration technique researchers are analysing its reliability and cost effectiveness. Due importance should be given to crack depth, its location, type and the effects caused by it on the health of the structure. Type of the crack also plays an important role in this study, as whether the crack is breathing crack or closed crack. Location of the crack means whether the crack is near the supports, edges or in the middle of the beam. Any damage however small may be alters the dynamic response of the structure causing stiffness reduction eventually resulting into changes in the natural frequencies and mode shapes of the structure. In this paper, the research done by previous researchers has been studied, viewed and analysed. Thus, modeling and the dynamics of the cracked structures has been a subject of intensive investigations in the last three decades.

1.1 LITERATURE REVIEW

Here are some research reviews done by researchers

Prathmesh1 In this paper a model for free vibration analysis of a beam with an open edge crack has been presented. Variations of natural frequencies due to crack at various locations and with varying crack depths have been studied. The cracked beams with different boundary conditions have been analyzed. The results obtained by experiments performed by previous studies are compared with those obtained by finite element analysis by using ABAQUS software. It was observed that the natural frequency changes substantially due to the presence of cracks depending upon location and size of crack.

Saidiabdelkrim.et.al (2014)- He analyzed the vibration behavior of concrete beams both experimentally and using ANSYS software subjected to the crack under free vibration cases. Experiments were conducted by using FFT Analyzer, Accelerometer, Modal hammer. It was observed that when the location of the crack increases starting from the clamped end of the beam, natural frequencies of the beam and the amplitude of high frequency vibration also increase, but the amplitude of low frequency vibration decreases.

Sirca.et.al(2012)- presented system identification in structures using multi-paradigm approach for large structures with non linear behavior subjected to unknown dynamic loading such as strong ground motions.

Huszar.et.al- studied the dynamic behavior of cracked reinforced and prestressed concrete beams using eigen frequencies. The connection between the prestressing force and the virtual eigen frequencies of the cracked beam was investigate by numeric simulation.

Kilichi.et.al(2004)- In this study, a technique of analyzing the vibration problem of reinforced concrete beam members including bond slip of the reinforcements is proposed. Virtual work is used to derive equations based on finite element method and numerical examples are provided.

Jena.et.al- presented theoretical, numerical (FEM) and experimental analysis of composite cracked beams of different boundary conditions using vibration mode shape curvatures. The effect on natural frequencies and mode shapes for different boundary conditions are studied by varying crack positions and crack depth. It has been concluded from this study that with increase in crack depth, the relative frequencies reduce in order due to drop in stiffness of the