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The Effect of Shape Memory Alloy in Composite Beam

M. Narasimha[1], K. Kishore Babu[2]
[1,2]Dept. of Civil, KLBS, Koneru Lakshmaiah Education Foundation, Guntur, India.

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***Abstract*:** *This study deals with the static examination of the effect of shape memory alloy using finite element analysis oneness software. In this paper, a fundamentally supported carbon/epoxy beam is considered. A point stack of 10 KN is applied at the to player of the carbon/epoxy carbon/ epoxy beam. The boundary condition is same for with and without SMA wire. this researchworkinvolvesanalysisofthe1000mmlengthcarbon/epoxycarbon/epoxy shaft. the shape memory mix wire is used at the top surface over the unprejudiced turn of the carbon/epoxy point of support. The shape memory compound wire which is 10% by volume part of the whole carbon/epoxy beam. After performing analysis we compare both the result with SMA and without SMA wire. In this analysis we compare the maximum deformation, Equivalent(von-misses) nervousness. From the above result, we have seen the effect of shape memory compound wire on the carbon/epoxy beam. All the procedure which is used to assessment the carbon/epoxybeamiscontrolledbyansyssoftware.*

Key Words: *Carbon/Epoxy, Shape Memory Alloy, ANSYS Workbench, Finite Element Analysis, Fiber Volume Fraction.*

I.INTRODUCTION

In the past few decades, we saw that shape memory alloy (SMA) have the capability of supporting large in elastics train (H.,1987).The mathematical modeling of the multi-dimensional and one-dimensional system made up of shape memory alloy have received their attention in the literature (Bernardini D, 2003). In this research paper, weanalyzethecarbon/epoxy carbon/ epoxy beam with and without the use of shape memory alloy and compare the result for stress, strain. And displacement. the shape memory alloy wire is used is10%by the volume fraction of the carbon/epoxy beam. The material properties used to analysis the composite beam is defined as the earlier researches to get the efficient result (S.M.R. Khalili, 2013).The goal of the study is to explore the effects for material shape memory alloy wire when10% of volume fraction is used in the carbon/epoxy beam.

Hereinfigure1, we have the cross-section of the beam that is designed in the geometry. The elevation of the carbon/epoxy beam with SMA wire. In figure 2 we show the carbon/epoxy beam with SMA wire. In fig 3 we show the carbon/epoxy beam without SMA wire. The connections and supports are made in the beam.

II.MATERIALPROPERTIES

THE MATERIAL PROPERTIES AND THEIR COEFFICIENT OF VARIATIONS ARE GIVEN BELOW IN TABLE1.

Property	Shape memory alloy
Density(kg/m^3)	6450
Youngmodulas(Pa)	6.7E+10
Poissionratio	0.33
SigmaSAS(MPA)	100
SigmaFAS(MPA)	170
SigmaSSA(MPA)	239
SigmaFSA(MPA)	170
Epsilon(mm^-1)	0.067
alpha	0

Table1.PropertiesShapeMemoryAlloy

III.MODELLINGANDLOADING

Neglecting to recollect accurate results of the analysis, the Finite element software ANSYS Work bench Is used. The highlights and details for modeling and load application are explained here.

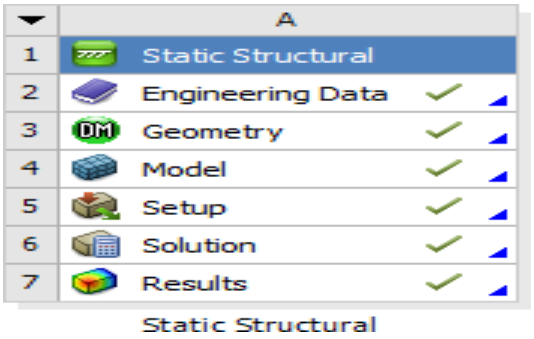

Fig.2.*SchematicChartOfAnalysis.*

IV.RESULTSANDCOMPARISON

A couple of results are open after reenactment of the carbon/epoxy beam with and without SMA by using10%ofSMAby volume. The main base was on the total deformation, same (von-misses)stress and elastic strain.

Results obtained are as follows:-

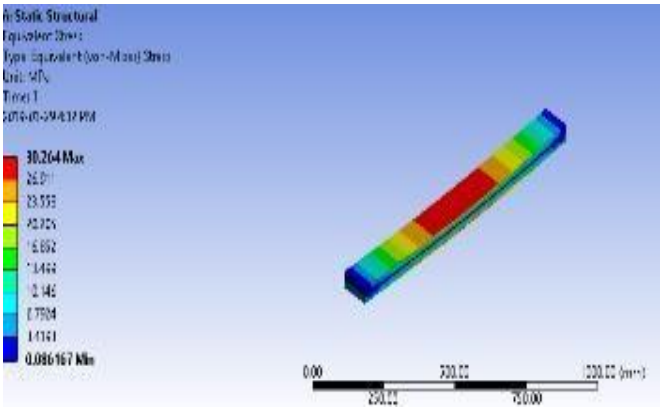

Fig.3.EquivalentStressWithoutShapeMemoryAlloy

V.CONCLUSION

On the basis of the above results, it is concluded that:

1. Thedeformationisabouthalfbyusingtheshapememoryalloywireinthebeam.
2. We will get about more than twice stress by using shape memory alloy wires.
3. The strain is reduced by1.25times by using SMAs wires in the carbon/epoxy beam.

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