Suspension Arm Model for Increasing Stability of Four Wheeler - Analytical Study

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Abstract— The following article is about the analysis of suspension model that is used for increasing the stability of four wheelers turning at elevated speeds. The analysis of software model can generate locations of different stresses that will be encountered while working of the suspension unit. Suspension is the term given to the system of springs, shock absorbers and linkages that connects a vehicle to its wheels. Serve a dual purpose – contributing to the car's handling and braking. Protects the vehicle itself and any cargo or luggage from damage and wear. Also increases the passenger comfort and isolates from road bumps and irregularities. This paper also signifies the use of adaptive control over the conventional suspension systems. A detailed analysis and significant research efforts have been devoted to the investigation of structured analysis of the suspension strut. The effects of the variable parameter such as stress, strain and displacement are computed in the structural analysis. A static analysis gives you certain information about your model.

Key words: Stresses, Adaptive Control, Structure Analysis, Shock Absorber, Suspension Linkages

I. INTRODUCTION

In day-to-day life every aspect is influenced by the work of engineer. The equipments we use, and the vehicles we travel in and many more all are developed with the assistance of design engineering. Traditional design has been done by simple calculation. As product performance becomes more important and as designs becomes more complex the simple method have becomes inadequate. To understand the growth and its implication for design, it is necessary to look at how design solutions are implemented. A static analysis calculates deformations, stresses, and strains on your model in response to specified constraints. For example, a static analysis tells you if the material in your model will stand stress and if the part will break (stress analysis), where the part will break (strain analysis), and how much the shape of the model changes (deformation analysis). ANSYS automatically calculates all measures valid for a static analysis.

II. NEED OF ANALYTICAL STUDY

Most engineering designs are too complex for traditional approach. For example a structure may have spatially dependent material properties if different materials are used; the geometry may be irregular in some sense or the boundary condition may be complex. In all these examples no solution functions exist and so solutions can be achieved only by resorting to an approximate numerical method.

III. STEPS INVOLVED

Following are the different steps that are involved in analysis of suspension model:

- Defining the geometry in computational form
- Definition of a mesh of nodes and elements to represent the geometry
- Definition of boundary conditions
- Application of boundary conditions
- Application of initial condition whenever necessary
- Definition of material and physical properties for groups of elements
- Application of controlled parameters for solver.

IV. ANALYSIS DATA

The software data in form of images and tabulated values is given below:

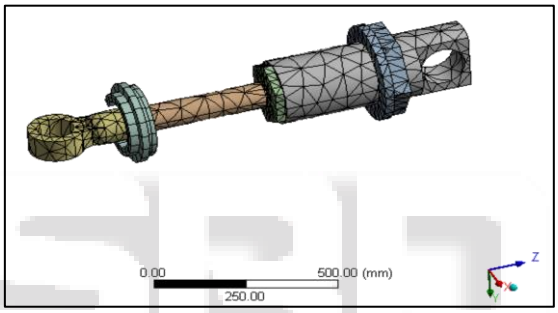

Fig. 1: Mesh Generation

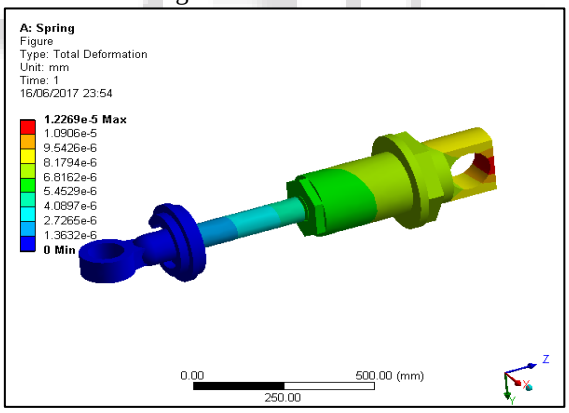

Fig. 2: Total Deformation

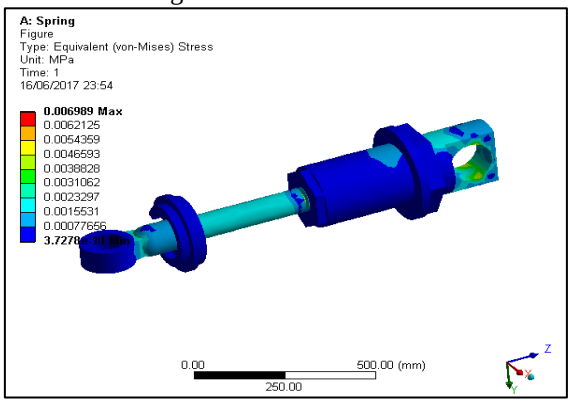

Fig. 3: Equivalent Stress

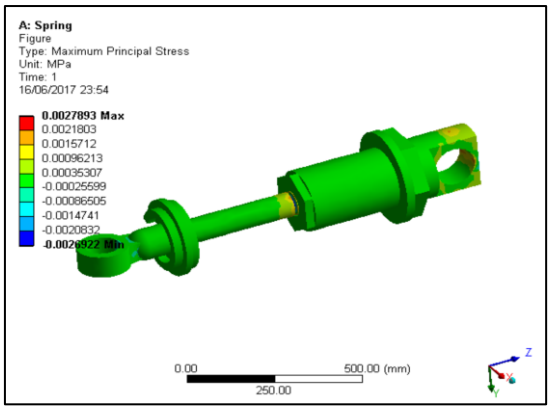

Fig. 4: Maximum Principal Stress

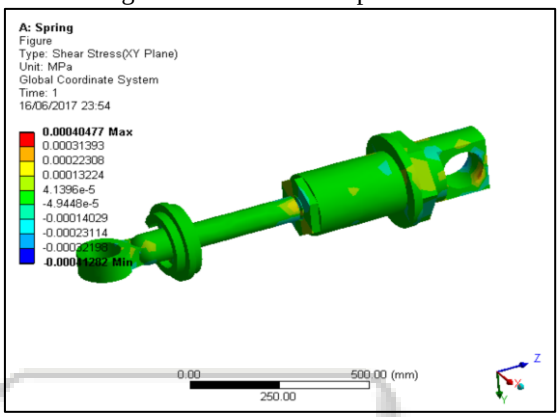

Fig. 5: Shear Stress

V. RESULT

Parameter	Minimum value	Maximum Value
Total Deformation	0.0 mm	1.2269e-005 mm
Equivalent Stress	3.7278e-010 MPa	6.989e-003 MPa
Maximum Principal Stress	-2.6922e-003 MPa	2.7893e-003 MPa
Shear Stress	-4.1282e-004 MPa	4.0477e-004 MPa

Table 1: Result

VI. CONCLUSION

As the total deformation and all the stresses values are under the permissible limit we can conclude that our analysis is successful. From the analytical result of the suspension model, we can make sure that the material selected for given component is safe for further course of action.

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