# Simulation and Analysis of Suspension System Based on Co-simulation.

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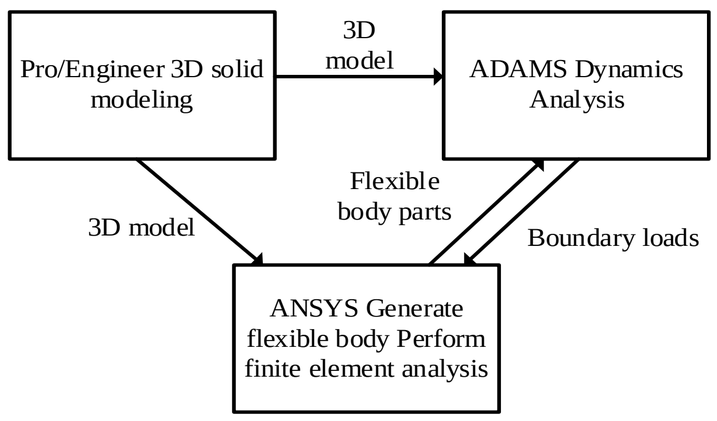
## Introduction

- The suspension system is one of the essential systems in automobiles, influencing the smoothness of driving, the life of components, and the vehicle's safety performance;
- Previously, the study of the dynamic performance of the suspension system was mainly based on traditional empirical calculations and field test methods, which can no longer meet the needs of the modern automotive industry for the speed of development of new models.

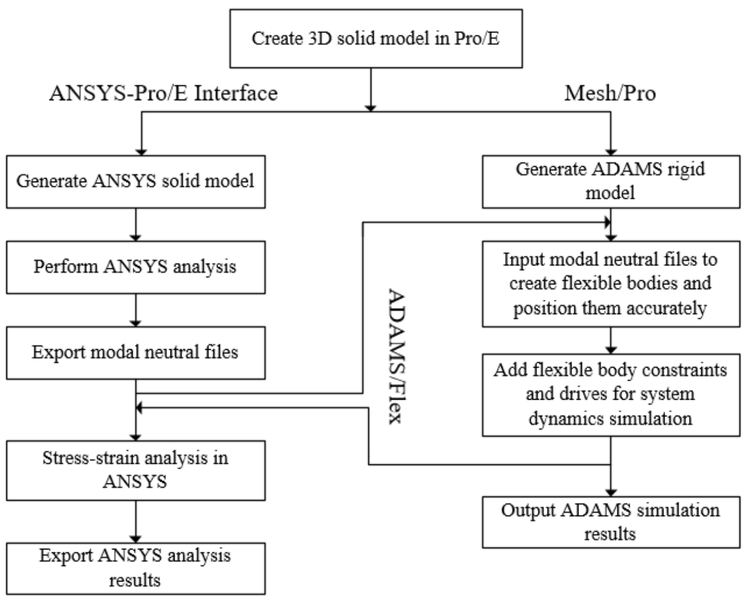
## Objective

A hybrid simulation analysis approach based on dynamic simulation and finite element analysis is proposed in this research.



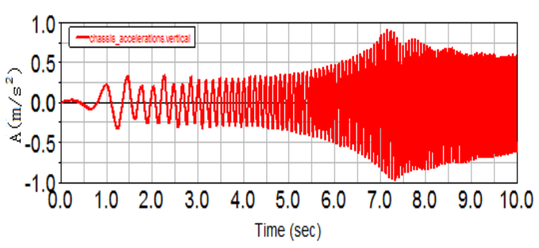

## Methodology

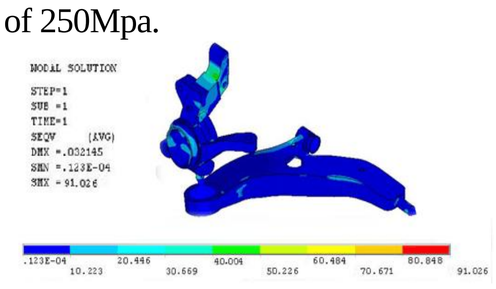
- Mechanical CAD solid model created by modelling in Pro/Engineer is used directly;
- Import models into ADAMS through seamless interface to ADAMS
- Through the ANSYS-Pro/E interface, rigid body models that need to be processed as flexible bodies are imported into ANSYS for modal analysis and modal neutral files;
- Through the interface between ADAMS and ANSYS, the obtained flexible body is replaced with the corresponding rigid body, that is, the flexible body dynamic mechanical model of ADAMS is obtained and finite element analysis is performed.




## Results

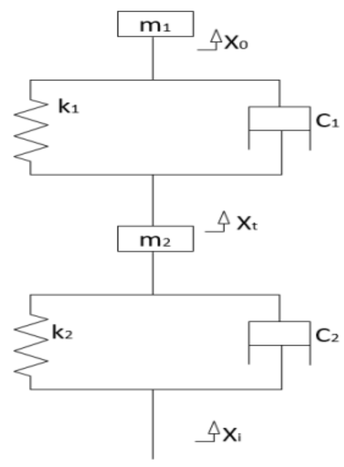
- Maximum vertical vibration acceleration of the vehicle body is 1.13m/s ². The RMS value of weighted acceleration obtained by the conversion is 0.398 m/s ².
- The top section of the steering knuckle is the major bearing part, and the most significant stress point is found at the neck root of the upper part, with a value of 90.026Mpa and a material permitted stress of 250Mpa.




## Basic Principle of the Suspension System

Tires and suspensions play an essential role in the entire vehicle's smoothness during road excitation transmission to driver's body. A simplified wheel-suspension theory model is established by combining tires and suspension




## Discussion and Conclusion

- A joint simulation analysis technique for mechanical systems is proposed based on dynamics simulation and finite element analysis.
- The rigid-flexible coupled model modelling method of a mechanical system is studied using 3D modelling, dynamics simulation, finite element analysis, as well as interface software, and the data exchange and sharing system of simulation and analysis system are built. The joint simulation analysis mode is analyzed, laying the groundwork for the smooth implementation of joint simulation of the mechanical system.
- The dynamic simulation of McPherson suspension and the finite element analysis of crucial suspension components are carried out according to the core principle of joint simulation technology, which is based on the basic principle of the suspension system. The simulation findings reveal that the dynamic performance of the suspension satisfies the standards, as does the strength of critical suspension components.

## References

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