1. Introduction

Today, the vehicle dynamic design is getting highly refined but there is a need to better understand and efficiently design spatial suspensions which have complex 3D motions and also explain their effects on the overall vehicle level. This thesis aims to do the same.

2. Instant Screw Theory (IST)

\[ v_B = v_A + \omega \times r_{AB} \]

\[ v_A = \omega \cdot s \]

\( \dot{s} \) - rate of screw pitch (scalar)

\( \omega \) - Instant Screw Axis (ISA)

3. Planar Suspension Analysis

4. Spatial Suspension Analysis (2D)

5. Method Development for Susp. Analysis

<table>
<thead>
<tr>
<th>Vehicle Suspension</th>
<th>Suspension Kinematics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity of Motion</td>
<td>2D Motion</td>
</tr>
<tr>
<td>Type of Calculation</td>
<td>2D Calculation</td>
</tr>
<tr>
<td>Type of Analysis</td>
<td>2D Analysis</td>
</tr>
</tbody>
</table>

6. Spatial Suspension Analysis (3D) (Ongoing work)

7. Summary

The Instant Screw Theory is helpful in analyzing spatial suspensions which have complex 3D motions. It can be used for better understanding of suspensions and be used as a tool for design and visualization. Future work regarding the use of screw axis of chassis has great promise for the development of high fidelity load transfer model as well.

Reference

[2] Roll Center Location, Output of Suspension Analysis, MSC Adams Car Help, 2018

Contact

Ron: geron@student.chalmers.se; Sidhant: sidhant@student.chalmers.se