



**R M K COLLEGE OF ENGINEERING AND TECHNOLOGY**  
RSM NAGAR, PUDUVOYAL – 601 206

**Department of Science and Humanities**

**Report on the Guest Lecture**

The Department of Science and Humanities organized a special lecture on “**Mathematical Approaches to the Real World Automotive Industry**” on 14<sup>th</sup> June 2021 at 2.30 - 3.40 PM for First Year Mechanical Students virtually through Google meet.

The aim of this guest lecture is to deliver knowledge about Mathematical Approaches to the Real World Automotive Industry, its applications in Industry Future Scope and Job Opportunities in the domain.

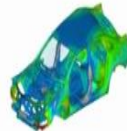
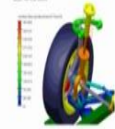
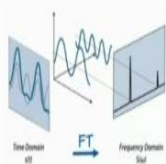
The event started with the welcome address by Dr S M Chithra, Branch Coordinator, Mechanical and introduction to the Chief Guest by Mr S Sanjay, Student Mechanical.

This Lecture is provided by a Professor **Mr RAJIVGANDHI K**, Engineer, FCA Engineering India Pvt. Ltd, Chennai to conduct a motivational talk on Mathematical Approaches to the Real World Automotive Industry. We are proud to have **Mr RAJIVGANDHI K**, Engineer, as our Guest Speaker. His accumulated experience and knowledge is the most formidable. The entire motivational talk is about our theme Mathematical Approaches to the Real World Automotive Industry.

This helps us to set a dream and goals which we never thought off due to our hesitation of choosing a path to walk on. Basically, all of us gain a lot of confidence in what we want to achieve in our life. With this lecturer, students come to know about Mathematical Approaches to the Real World Automotive Industry in detail. They also enlighten on industrial applications and Job opportunities in this area. **Mr Siddavatam Nishanth Reddy**, student, Mechanical proposed vote of thanks.

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## MATHEMATICAL APPROACHES TO THE REAL WORLD AUTOMOTIVE INDUSTRY



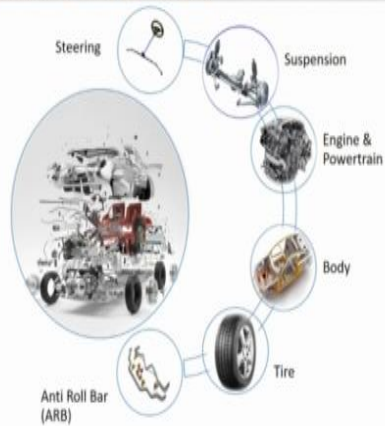
By,  
Rajivgandhi K  
Vehicle Dynamics Engineer

Chithra is presenting

12-JUN-2021

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## BACKGROUND: VEHICLE ARCHITECTURE



Chithra is presenting

05 May 2020

TOPIC: MATHEMATICAL APPROACHES TO THE REAL WORLD AUTOMOTIVE INDUSTRY

**MATHEMATICAL CONCEPTS AND ITS APPLICATION : EIGEN VALUE AND VECTOR**

**Mathematical Concepts**

$AV = \lambda V$

Where  $\lambda$  is the eigen value or the characteristic value of vector  $V$ .

Eigen value are obtained by determinant of  $(A - \lambda I)$  - Identity matrix

Mathematically lets consider a square matrix  $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$

$AV = \lambda V$        $AV = \lambda I V$        $AV - \lambda I V = 0$

$AV - \lambda I V = 0$        $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} - \lambda \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$

$(A - \lambda I)V = 0$        $\begin{vmatrix} a-\lambda & b \\ c & d-\lambda \end{vmatrix} = 0$        $\begin{cases} x + 2y = 0 \\ 2x + 4y = 0 \end{cases}$

$x^2 - 3x + 4 = 0$        $-4x + 2y = 0$

Eigen value  $\lambda = 1, 4 + i$       Eigen vector  $x = 1, y = 2$

Solve this

$A = \begin{pmatrix} \cos 300 & -\sin 300 \\ \sin 300 & \cos 300 \end{pmatrix}$

Which takes you to a Complex solution ✓

Eigen value  $\lambda = \frac{1}{2} \pm \frac{\sqrt{3}}{2}i$       Eigen vector  $\begin{pmatrix} 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ -1 \end{pmatrix}$


**Physical Applications**

In all sort of vibration analysis by evaluating the Modal behaviour of a system may be building/vehicle/any individual part subjected for excitation


Image processing - Face recognition and AI and associated technologies

$[V] = [eig(A, M)]$

Mode 1:  $V$  Mode shape or Eigen vector  
D: Natural Frequency or Eigen Value

Mode 2: 

Mode 3: **Mode shape of body**

Mode 4: 

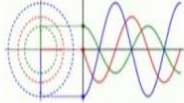
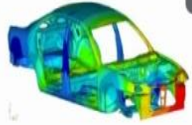
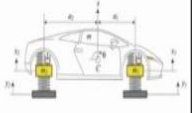
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**ENGINEERING MATHEMATICS?**

ENGINEERING MATHEMATICS

To really going to use in my life?

1. Matrix - Eigen
2. Differentiation
3. Integration
4. Complex number (real, imaginary)
4. Fourier Transform

Chithra is presenting

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