

## Model Based Simulation Approach to a 14-Dof Car Model Using Matlab/Simulink

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**Abstract :** A fourteen degree of freedom (DOF) ride and handling control mathematical model is developed for a car using generalized boltzmann hamel equation which will create a basis for design of ride and handling controller. Mathematical model developed yield equations of motion for non-holonomic constrained systems in quasi-coordinates. The governing differential equation developed integrates ride and handling control of car. Model-based systems engineering approach is implemented for simulation using matlab/simulink, vehicle's response in different DOF is examined and later validated using commercial software (ADAMS). This manuscript involves detailed derivation of full car vehicle model which provides response in longitudinal, lateral and yaw motion to demonstrate the advantages of the developed model over the existing dynamic model. The dynamic behaviour of the developed ride and handling model is simulated for different road conditions.

**Keywords :** Full Vehicle Model, MBSE, Non Holonomic Constraints, Boltzmann Hamel Equation

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