Road Vehicle Dynamics: Fundamentals and Modeling
Georg Rill
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The book includes topics on fundamentals and approaches to simulation modeling which, according to the author, makes it a useful tool either as a school text or for self-study. With a list of figures, a list of tables, a list of listings (for MATLAB®) and a rather thorough index and bibliography, this ten chapter book is meant as a textbook for undergraduates (the fundamentals) and possibly for graduates (the modeling).

The ten chapters, with MATLAB® programs included and exercises following each, are:

1. Introduction (26 pp.) — deals with units, (all in SI), quantities and introductory terminology, including, for example, definitions of toe-in and toe-out. It also "introduces" multi-body dynamics.
2. Road (26 pp.) — treats the road: how to model it, simply, by using sinusoidal profile, adding bumps and potholes, and then more complex using stochastic approaches.
3. Tire (57 pp.) — explains the issues that the traction, elasticity, loading on a tire, dynamics and resistance.
4. Drive train (24 pp.) — discusses the overall drive train system, wheel-tire dynamics, differentials, transmissions, etc.
5. Suspension systems (32 pp.) — explains how the suspension including different steering systems and double-wishbone suspension work.
6. Force elements (30 pp.) — this is about the components that transmit force and torque and that includes dampers, and metal and fluid springs. The chapter discusses non-linear aspects too.
7. Vertical dynamics (33 pp.) — simple to complex — for ride comfort over a road including linear and non-linear effects and eigenfrequencies.
8. Longitudinal dynamics (24 pp.) — concerns braking in a straight or curved path and vehicle acceleration issues.
9. Lateral dynamics (44 pp.) — starts off with wheel geometry in a turn, also explains the effects of turns, cornering, including electronic stability control.
10. Driving behavior of single vehicles (20 pp.) — adding up everything and modeling the performance of a three dimensional vehicle including driver model, driving maneuvers and the loading of the vehicle with passengers or cargo.

As expected in a text, the volume is filled with equations, MATLAB® listings, figures and tables. It goes from rather simple concepts, say linear analysis, to sophisticated treatments, like non-linear vibrations.

I liked this book, meant for undergraduates, although this is probably better suited for graduate level courses and most useful for those that are fluent in MATLAB. For the readers of NCEJ, I would recommend it as the most useful reference.

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