

Lateral dynamic features of a railway vehicle - DTU Orbit (08/11/2017)

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The lateral dynamic features of a railway vehicle are investigated using two similar wheel/rail contact models: the Vermeulen-Johnson and the Shen-Hedrick-Elkins models. The symmetric/asymmetric bifurcation behaviour and chaotic motions of the railway vehicle are investigated in great detail by varying the speed and using the resultant bifurcation diagram' method. It is found that multiple solution branches exist and they can lead to more steady states in the dynamic behaviour of the railway vehicle. The coexistence of multiple steady states can lead to jumps in the amplitude of oscillations, resulting in problems for safe operation of the vehicle. Therefore, it should be avoided in everyday operation. Furthermore, the creation of multiple solution branches suggests that the critical speed of a vehicle should be determined from a comprehensive analysis of the various kinds of possible excitations and numerous tests.

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