Analysis of chaotic vibration of a nonlinear seven degrees-of-freedom full vehicle model

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In this paper, the dynamic behavior of a nonlinear seven degrees-of-freedom ground vehicle model is examined. The nonlinearity occurs due to suspension dampers and springs. The disturbances from the road are assumed to be sinusoid and the time delay between the disturbances is also considered. Numerical results show that the responses of the vehicle model could be chaotic. Using bifurcation phenomenon, the chaotic motion is detected and confirmed with the Poincare maps. The results can be applicable in dynamic design of a vehicle.

Keywords: Nonlinear dynamics; Chaos; Bifurcation; Poincare’ map