# Vehicle Suspensions with a Mechatronic Network Strut

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## Abstract

This paper applies a novel mechatronic network strut to vehicle suspensions and discusses the benefits of system performance. The proposed mechatronic strut consists of a ball-screw inerter and permanent magnet electric machinery, such that the system impedance can be realised through a combination of mechanical and electrical networks. Applying the mechatronic strut to vehicle suspensions, we evaluate the improvement of system performance using passive electrical networks. Furthermore, a prototype mechatronic strut is constructed for properties verification. Finally, nonlinearities of the mechatronic strut are taken into account to modify the suspension design. From the simulation and experimental results, the proposed mechatronic network strut is shown to be effective.