

Network Optimization and Synthesis using a Combined Mechanical and Electrical System: Application to Vehicle Suspension Control

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Abstract

This paper introduces a mechatronic network and applies it to vehicle suspensions for performance optimization. The mechatronic network consists of a ball-screw and permanent magnet electric machinery (PMEM), such that the system impedance is a combination of mechanical and electrical impedances. We then apply the network to vehicle suspensions, and demonstrate the performance benefits and their sensitivities to parameter variations. The optimal electrical impedances are constructed and experimentally verified. Based on the results, the mechatronic network is deemed effective.