

Vehicle Dynamics Design for a PM / EDS Maglev System

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ABSTRACT

The first PM / EDS maglev chassis was built and tested on 120m test track in General Atomics San Diego campus. In this maglev system, high field permanent magnets with $B_r = 1.4T$ were extensively used in a system design of both levitation and the LSM propulsion. Currently General Atomics is in the process of designing of a 2nd chassis with various design changes and improvements. After the 2nd chassis is built and tested, the two chassis will be put together to make a full test vehicle. In the process, the changes and improvements made for the 2nd chassis will be incorporated into the 1st chassis to make the two chassis forming an entire vehicle compatible.

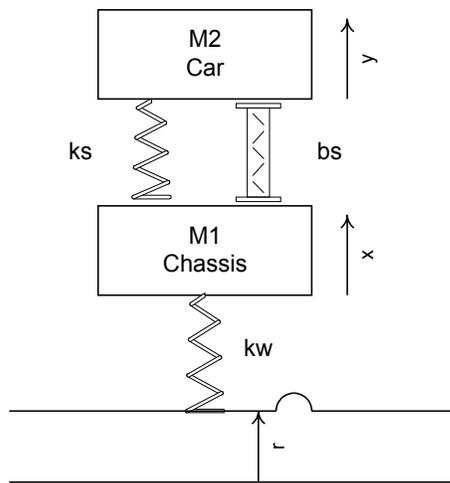


Figure 1 Schematics of GA Urban Maglev Suspension System

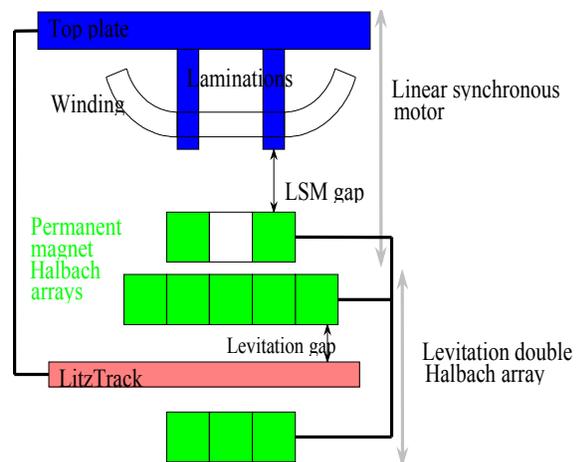


Figure 2 Primary Suspension (k_w of Fig 1) Magnet Array

The important changes for the 2nd chassis are related to the primary and secondary suspension systems (Figure 1). The repulsive force between the Inductrack and the magnet array constitutes the primary suspension system. The present configuration, shown in Figure 2 (5 upper x 3 lower), is being remodeled to 5 x 5 array configuration. This configuration is expected to give both the required levitation stiffness(k_w) such that natural frequency (5-6 Hz) is separated enough from that of the secondary suspension(k_s) (~1Hz) to avoid strong coupling between the primary and secondary suspensions that may lead to unwanted resonances. The magnetic dampers (Lord Rheonetic Damper) used in the 1st chassis are being resized using more conventional dampers. The allocation of mass between primary and secondary also is found to have a significant impact on the design of the suspension system and ride quality. The performances of the new chassis will be verified thru static and dynamic tests and compared with the test results from the 1st chassis.

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