

Conceptional Design of a Hyperloop Capsule with Linear Induction Propulsion System

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Abstract : High-speed transportation is a growing concern. To develop high-speed rails and to increase high-speed efficiencies, the idea of Hyperloop was introduced. The challenge is to overcome the difficulties of managing friction and air-resistance which become substantial when vehicles approach high speeds. In this paper, we are presenting the methodologies of the capsule design which got a design concept innovation award at SpaceX competition in January, 2016. MATLAB scripts are written for the levitation and propulsion calculations and iterations. Computational Fluid Dynamics (CFD) is used to simulate the air flow around the capsule considering the effect of the axial-flow air compressor and the levitation cushion on the air flow. The design procedures of a single-sided linear induction motor are analyzed in detail and its geometric and magnetic parameters are determined. A structural design is introduced and Finite Element Method (FEM) is used to analyze the stresses in different parts. The configuration and the arrangement of the components are illustrated. Moreover, comments on manufacturing are made.

Keywords : high-speed transportation, hyperloop, railways transportation, single-sided linear induction Motor (SLIM)

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