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Modeling of Magnetic Resonance Wireless Electric Vehicle Charging

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1 Motivation

In recent decades, there have been significant developments and breakthroughs in-technology. The use of a variety of autonomous electronics devices; such as mobile phones, laptops, tablets and home appliances has significantly increased due to consumer demands. Such electronics contain on-board energy storage modules in the form of lithium based batteries. These batteries have normally been charged by conventional battery chargers through physical contacts. This form of connection increases the risk of short circuits; either by water or foreign objects crossing the contacts, or due to damaged connectors. In addition, different electronic devices have different power ratings as well as a variety of standardized chargers. For example, mobile phones have different plug-in chargers and power ratings than laptops. This is not only limited to low power devices but it is also applicable to medium to high voltage battery operated equipment such as fork lifts, Electric Vehicles (EVs) and electric public transport systems. Standardised chargers create inconvenience to the users when they travel to another country. Moreover, when such electronic devices are upgraded or replaced, the chargers also need replacing even though they may still be in good working order. These unused devices end up in landfill because of improper recycling. This is known as electronic waste (E-Waste). Worldwide 20 to 50 million tonnes of E-Waste is annually generated.

2 Introduction

Auto shows are premiere events for presenting new electrified vehicle (EV) models and e-mobility strategies. 1 Yet at recent salons, the limelight returned to SUVs, pickups, and crossovers powered by combustion engines. Besides enjoying red-hot sales right now, these models with conventional powertrains are generally much more profitable, relegating many EV models to the shadows.

The muted reception for EVs reflects the industry's tempered excitement about the short- term economic potential for electrification. Automakers know that the need for electrification strategies will grow, given that global sales of battery electric vehicles (BEVs) and plug-in hybrid vehicles (PHEVs) have grown quickly from 6,000 units in 2010 to more than 400,000 units through the first three quarters of 2016. 2 They also view e-mobility as essential to achieving compliance with emission and fuel economy targets and mandates. At the same time, it is clear that internal combustion engines (ICE) will remain a critical part of most automakers' powertrain strategies.

As a result, automakers face a difficult challenge: They must strike the right balance between selling enough EVs to comply with tightening regulatory fleet emissions and fuel economy targets, while also preventing the incremental cost of adding battery packs from cannibalizing corporate profits. At the same time, automakers cannot afford to lose focus on ICE models, which are often more profitable [1]

3 Literature Review

4 Objective

5 Methodology

5.1 Study of literature

5.2 Development of Simulation Model

5.3 Terms

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6 Operating Theory

References

[1] Stefan M Knupfer, Russell Hensley, Patrick Hertzke, Patrick Schaufuss, Nicholas Laverty, and Nicolaas Kramer. Electrifying insights: How automakers can drive electrified vehicle sales and profitability. *McKinsey & Company*, 2017.

[2] T Shimamoto, I Laakso, and A Hirata. Internal electric field in pregnant-woman model for wireless power transfer systems in electric vehicles. *Electronics Letters*, 51(25):2136–2137, 2015.