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Investigation of AC-AC Converter Technology for Electric Vehicle Motor Control and Fast Battery Charging

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AbstractDocument SectionsI. IntroductionII. Problem StatementIII. Switching AlgorithmIV. ResultsV. Conclusion

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**Abstract:**  
A new converter technology 3\*1 Matrix converter (MC) for 3-Ph induction motor control is presented in this paper for Electric & Hybrid cars. In the projected approach, the MC straightforwardly changes over the lower order frequency (50/60 Hz, 3-ph) contribution to a high order frequency (6 kHz, one stage) AC output without a dc-interface. The MC output is then prepared through a PWM rectifier through a high frequency (HF) isolation transformer to interface with the EV battery. The MC-PWM rectifier system is made to work like a double dynamic extension (DDE), working with bi-directional power appropriate for fast battery charging and 3 stage induction motor Control application. The computerized system control guarantees that the in-flows are working properly in both charging and discharge situation. Because of the shortfall of dc-connect electrolytic capacitors, power thickness of the advanced rectifier is relied upon to be higher. Investigation, design model and expanded results of simulation are introduced for a 3-ph induction motor, 50kW Battery charger.

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Contents

I. Introduction

Reports of WHO has exposed that India has 13 most polluted cities out of the 20 cities in the globe are in India. It is noteworthy that emissions from the transport sector have increased the level of pollution in India. According to the estimates of the central Ministry of India that this segment emit 188 metric tons of carbon till 2010, of which scooter, car, bus and truck accounted for 86 % contribution. The region is moreover a major consumer of oil and currently oil import dependency of India is around 79%. As per official report of PPAC, crude oil contributes to 40% and 13% of oil consumption. Department projected that 72% of diesel and 99% of petrol demand was from the transport sector. Electric Cars can prove to be a game changer or paradigm shift in transportation in India [1]. In fact, Electric Cars are 3.2 times further energy proficient than conventional IC engine-based vehicles for regular operation. In addition, Electric Cars do not generate any emissions; hence there is no local pollution. Thus, the adoption of Electric Cars will prove to be an important step towards not only reducing oil imports, but also improving local air quality can also assist. Efforts made at various levels and several efforts have been made to promote Electric Cars globally (including financial/non-financial incentives to end users) [2].

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