A Study on the Operation Strategy of Battery Swapping Station Based on Lotka-Volterra Equation

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Abstract:

Battery Swap Stations (BSS) are increasing in installation due to the advantages of convenience and battery lifespan management offered by direct battery swapping, instead of the traditional method of recharging used batteries, as the adoption of electric two-wheelers expands and IoT technology develops. As a result, electric two-wheelers and Battery Swap Stations (BSS) are interrelated in terms of energy use and charging, and this relationship is crucial for the efficient operation of vehicles and the expansion of charging infrastructure. This paper aims to examine the interrelationship between charged and discharged batteries through the modeling of battery exchange for service-type electric two-wheelers using the Lotka-Volterra equations, and to predict the optimal BSS charging ecosystem based on these findings for practical implementation.

Keywords:

Electric Two-Wheeler, Battery Swapping Station, Battery Exchange, Lotka-Volterra Equation.