4.3　非接触給電

（非接触給電車両用の）蓄電装置容量を最小化する電気鉄道の運転曲線設計法

A Design Method of Running Profiles of Electric Train MinimizingRequired Capacity of Energy Storage Devices

(--For a Train fed by Intermittent Contactless Power Transmission--)

Doan Van Duc

In recent times, CPT-powered Train has attracted much attention because it avoids the disadvantages of ordinary trains fed by catenary wires, such as: high maintenance cost, noise and sparkling effects due to contact problem, and adverse effects on the city's landscape and also environment [1]. There are two configurations of CPT-powered train. In the first configuration, the train is supplied on road during its running (dynamic charging). This configuration ensures continuous energy supply, but it requires long power lines along with the rail; therefore, its construction cost is quite high. In this research, we want to focus on the second configuration of CPT-powered train, the train is frequently charged only during the stopping time at every station (static charging).

While there are many researches about designing CPT modules for train to improve efficiency and capacity of CPT module as well as reduce its size and weight, only few researches concern about the operation of CPT-powered train such as: (1) How to realize Energy-saving operation; (2) How to realize the operation to minimize Required Capacity of ESDs. To CPT-powered train, ESDs supply the main energy for the train, so their weight and size are quite large, even their cost is also high, which is currently a problem of CPT-powered Train. Therefore, the operation of CPT-powered Train to minimize Required Capacity of ESDs, leading to reduce the weight and size of ESDs, is especially desired. This research will find a solution for this problem by finding appropriate Running Profiles with the aim at minimizing Required Capacity of ESDs. In addition, the optimal Running Profile that ensures the Energy-saving operation of CPT-powered train also will be considered.

鉄道用電磁誘導式非接触装置の研究

松岡 秀樹

電気鉄道は省エネルギーで二酸化炭素排出も少ない、環境負荷の小さい交通手段であるが、架線等の饋電設備の導入コストが大きいという問題がある。これを解決する一つの方法として、駅停車中の充電を想定した非接触給電システムが挙げられる。

本研究では大容量の電力伝送に適している電磁誘導方式の非接触装置を採用し、電磁誘導方式の弱点である位置ずれ時の効率低下に着目して研究を行なった。複数のコア形状と補償回路方式に比較検討し、位置ずれ時においても高効率なシステムについて提案した。

A Study on Inductive Contactless Transfer for Railways

Hideki Matsuoka

Although electric railways require low energy and emit fewer CO2, it is a problem that initial costs for feeder facilities such as catenary lines are high. One of the solutions for this problem is a contactless power transfer system which feeds stopping trains in stations.

In this research, an inductive power transfer, which suits high power transfer, is adopted and the decline of efficiency under misalignment, which is a disadvantage of inductive power transfer, is focused. Comparing several shapes of cores and compensate circuits, high effective system even under misalignment is proposed.