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Wed-Mo-Po3.13-04 [112]: A Study on Design of Hybrid Type Electromagnet for Maglev

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Recently, as the demand for high-speed trains increases, studies on the stability of high-speed trains are actively under way. In the conventional case, most of the high-speed trains were driven by friction with the rails mounted on the rotating electric motor. In this case, unevenness and friction between the rail and the wheel caused the driving performance to drop, causing large vibration and noise in the carriage, resulting in instability. To improve this, Maglev is actively researched. Maglev is a system consisting of a levitation electromagnet and a linear motor. The levitation electromagnet is used to lift a bogie, and the linear motor is used to propel an injured bogie. This study is a study on the design of hybrid type permanent magnet type electromagnet. The levitation electromagnet is a structure that generates a guide force to prevent deviation from the outside in driving in addition to the levitation force for lifting the carriage. A typical electromagnet has two exciting electromagnet forms. In this case, the levitation force can be sufficiently generated according to the input current and the number of turns, but the guide force has a weak characteristic. In order to solve the problems of the existing model, this model proposed a three - axis type one - piece electromagnet. Since the electromagnet adopts one excitation structure, it is easy to manufacture, and it is possible to realize a robust Maglev system with the guide force improved through the three-spindle shape. In addition, detailed analysis of the iron loss in the levitation electromagnet was conducted through 3D-FEA analysis in the levitation electromagnet, and the durability of the system was verified through the demagnetization analysis of the permanent magnet. Finally, to verify the validity of this study, the fabrication and testing were carried out, and the test results and analysis results were compared and analyzed.

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