

Design and Analysis of Spherically Radial Magnetic Bearing with Dual-Winding

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Abstract

To improve sresponse performance of the magnetically suspended gimballing flywheel in wide frequency range, a spherical magnetic bearing with dual-winding structure is proposed. Working principle of dual-winding structure is introduced, and electromagnetic characteristics of the rotor in wideband range are analyzed by using equivalent magnetic circuit method and finite element simulation method. Simulation errors of the maximum electromagnetic force under low-frequency and high-frequency suspension are only 0.085 and 0.054 respectively. Experimental results show that the response time of the rotor from low frequency to high frequency is only 40ms. Simulation and experimental results is much better than those of the single winding structure.

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