



MT 26
International Conference
on Magnet Technology
Vancouver, Canada | 2019

Contribution ID: 1018

Type: **Poster Presentation**

Mon-Mo-Po1.09-11 [107]: Parameter Optimization Design of Six-pole AC Hybrid Magnetic Bearings Considering Variable Stiffness

Monday, 23 September 2019 09:15 (2 hours)

Besides the advantages of the conventional magnetic bearings such as high speed and high precision, AC magnetic bearings also have strengths such as small size and low cost because of the use of mature technology of inverter driving. Therefore, AC magnetic bearing has potential application prospects in industrial manufacturing, aeronautics and astronautics, wind power generation and other fields. However, the installation error of displacement sensors or the influence of the rotor non-uniform material and non-uniform heating will cause the working position of the rotor to deviate from the given reference position, resulting in the change of the stiffness of the magnetic bearing at different positions, which will reduce the rotation accuracy of the rotor and limit the further increase of rotor speed. In this paper, the influence of variable stiffness on the six-pole AC hybrid magnetic bearing is analyzed, and parameter optimization design is proposed.

Firstly, the structure of six-pole AC hybrid magnetic bearing is introduced and the formula of radial suspension force is derived by using the equivalent magnetic circuit method. Secondly, the variable stiffness coefficient is deduced according to the eccentric displacement, and the influence of the variable stiffness coefficient on the parameters design of magnetic bearing is analyzed. Thirdly, the parameter optimization design of six-pole AC hybrid magnetic bearing is carried out with reference to the characteristic of variable stiffness coefficient. Finally, simulations and experiments are carried out, the displacement waveforms of the rotor including floating, stable suspension and under external disturbance are tested. The simulation and experimental results show that the static and dynamic characteristics of the magnetic bearing are excellent. In other words, the parameter optimization design of the six-pole AC hybrid magnetic bearing which considers variable stiffness is feasible.

Primary authors: Ms WU, Mengyao (Jiangsu University); Prof. ZHU, Huangqiu (Jiangsu University)

Presenter: Ms WU, Mengyao (Jiangsu University)

Session Classification: Mon-Mo-Po1.09 - Levitation and Magnetic Bearings I