

基于非晶态合金的压磁式力传感器

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摘要:

为提高测力传感器的测量精度和灵敏度, 研制了一种以非晶态合金材料为压磁元件的测力传感器。首先, 对硅钢片、坡莫合金以及铁基非晶态合金的软磁特性进行了比较, 选择了国产Fe80B20辊剪薄带作为传感器铁芯冲片。其次, 通过对传感器的磁路分析, 推导出了它的感应输出方程。然后, 根据铁磁学和现有参考资料, 确定了传感器的各项技术参数。最后, 对传感器的静态特性以及励磁电流强度、励磁频率的影响进行了试验研究。试验结果显示, 非晶态合金压磁测力传感器比硅钢片、坡莫合金等晶态合金压磁传感器有更高的精度和灵敏度以及更宽的频率响应范围。

关键词: 压磁效应; 应力; 非晶态合金; 传感器

The Forces Sensor Based on Magnetostriction Effect of Amorphous Alloy

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Abstract:

In order to improve the measuring accuracy and the sensitivity of the force sensor, we have developed a new kind of the magnetoelasticity force sensor, which take the amorphous alloy material as it iron core. Firstly, we compared and analyzed the soft magnetism characteristic of the silicon steel sheet, the perm alloy as well as Fe-Base amorphous alloy, and chosen the domestically produced roller-cut Fe80B20 the thin belt to as the sensor ferrite core. Secondly, through analysis of sensor magnetic circuit, we derived its sensor output equation and according to the ferromagnetism and the existing reference, we determined the sensor technical parameter. Finally, we made the experimental on the sensor static characteristic as well as the exciting current intensity, the excitation frequency influence on its output performance. The experimental result show this kind of force sensor is much higher than those based on the silicon steel sheet and the perm alloy in the measuring accuracy and the sensitivity, and it also has more broad frequency response scope.

Keywords: magnetoelasticity effect; stress; amorphous alloy; sensor

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