EC09

The Effect on the Accuracy by Magnetic Flux Distribution in the Magnetostrictive Wire Type Displacement Sensor

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The magnetostrictive wire type displacement sensor utilizes the magnetostrictive effect and propagation of an elastic wave. The sensors of this type are used for the displacement measurement of the comparatively long distance of carrier line in the factory. Fig. 1 is showing the principle of the sensor. Pulsed currents are applied in the magnetostrictive wire. Then, the elastic waves are generated in the wire near the magnet installed to moving object. The elastic wave is detected on the edge of the wire, and by counting the delay time for pulsed current, it is possible to measure the magnet position. The handling is easy, because the magnet installed to the moving object is noncontact with the wire. However, the accuracy is drastically different by the shape of the magnetic flux density distribution installed to the moving object. By the change of the waveform of the pulsed current, we reported that the measurement accuracy of the displacement sensor could be improved [1]. The effects according to the magnet size (magnetic flux distribution) to the accuracy are examined here. In addition, the methods for reducing the error are devised. Fig. 2 is an example of the results. It is shown that it is kept to the error of 0.1 mm or less, even if it is the rough setting.

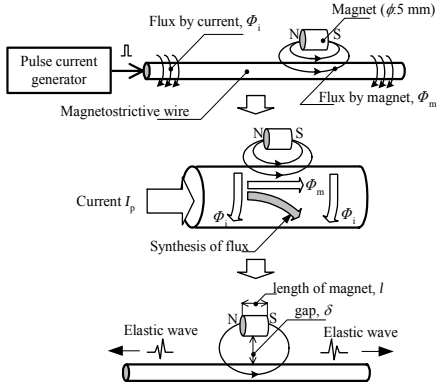

Fig. 1. Principle of the magnetostrictive wire type displacement sensor.

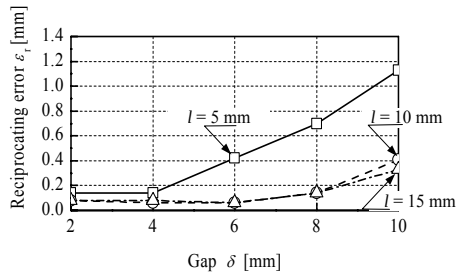

Fig. 2. Reciprocating error depending on the magnet size and gap.

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Quasi-*ab initio* Study on Structural Stability and Lattice Vibrations of R_7Ni_3 (R =, Nd, Sm, Gd)

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Abstract

By using a series of quasi-*ab initio* interatomic potentials, the crystal structures and stabilities of R_7Ni_3 (R = Nd, Sm, Gd) of the hexagonal Th_7Fe_3-type structure is studied. The calculated lattice constants coincide quite well with experimental values. Furthermore, some simple mechanical properties such as the elastic constants and bulk modulus are investigated for these materials. The phonon densities of states, vibrational entropy and Debye temperature related to dynamic phenomena are also evaluated. This work provides a new method for studying the thermodynamic properties for the rare earth materials with complex structures.

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