Claims

Claim 1

A method of measuring a defect of a magnetic member so as to inspect the defect, comprising the steps of:

measuring an output from a magnetic sensor with use of an inspection probe including a magnet and the magnetic sensor which is provided on a magnetic circuit formed by the magnet and the magnetic member and which detects a density of a magnetic flux flowing through the magnetic circuit; and

based on the output from the magnetic sensor, (i) determining whether or not the magnetic member has a defect and (ii) calculating a depth of the defect in directions in which the magnetic member and the magnet face each other,

the magnet generating a magnetic field such that a relative permeability of the magnetic member which corresponds to a density of a magnetic flux flowing through the magnetic circuit based on the magnetic field generated by the magnet monotonically decreases as the density of the magnetic flux increases.

Claim 2

The method as set forth in claim 1, further comprising the step of:

obtaining, before the measuring, a relational formula indicative of a relationship between an output from the magnetic sensor and a depth of a defect of the magnetic member to be inspected, the obtaining being carried out by associating, with use of a calibration magnetic member, an actual value of a depth of a defect of the calibration magnetic member with an output from the magnetic sensor,

in the calculating, the depth of the defect of the magnetic member being calculated, based on the relational formula, in accordance with the output from the magnetic sensor.

Claim 3

A defect measuring device comprising:

an inspection probe including

a magnet and

a magnetic sensor which is provided on a magnetic circuit formed by the magnet and a magnetic member and which detects a density of a magnetic flux flowing through the magnetic circuit; and

a defect depth calculating section which, based on an output from the magnetic sensor, (i) determines whether or not the magnetic member has a defect and (ii) calculates a depth of the defect in directions in which the magnetic member and the magnet face each other,

the magnet generating a magnetic field such that a relative permeability of the magnetic member which corresponds to a density of a magnetic flux flowing through the magnetic circuit based on the magnetic field generated by the magnet monotonically decreases as the density of the magnetic flux increases.

Claim 4

The defect measuring device as set forth in claim 3, further comprising:

a storage section in which a relational formula indicative of a relationship between an output from the magnetic sensor and a depth of a defect of the magnetic member to be inspected is stored, which relational formula is obtained by associating, with use of a calibration magnetic member, an actual value of a depth of a defect of the calibration magnetic member with an output from the magnetic sensor,

the defect depth calculating section calculating, based on the relational formula, the depth of the defect of the magnetic member in accordance with the output from the magnetic sensor.

Claim 5

An inspection probe which inspects a defect of a

magnetic member, comprising:

a magnet; and

a magnetic sensor which is provided on a magnetic circuit formed by the magnet and the magnetic member and which detects a density of a magnetic flux flowing through the magnetic circuit,

the magnet generating a magnetic field such that a relative permeability of the magnetic member which corresponds to a density of a magnetic flux flowing through the magnetic circuit based on the magnetic field generated by the magnet monotonically decreases as the density of the magnetic flux increases.

Claim 6

The inspection probe as set forth in claim 5, wherein:

the magnet is polarized in a direction in which the magnet faces the magnetic member;

the inspection probe further comprises

a yoke which is provided so as to face a surface of the magnet, which surface is opposite a surface which faces the magnetic member; and

the magnetic circuit is formed by the magnet, the magnetic member, and the yoke.