

ABSTRACT

A magnetic field induction system has been developed using single transmitting and receiving coils. The presence of a sine signal excitation on the transmitter coil generates an alternating magnetic field causing an induced electromotive force (emf) to the receiver coil (receiver). This initial development is based on the concept of Magnetic Inductance Tomography (MIT) method. Magnetic Inductance Tomography (MIT) is categorized as passive imaging by electrodeless technique through the use of a coil excitation to induce an electromagnetic field, which is then measured at the receiving end. The initial design of coils and coil systems is aided by COMSOL 4.4 Multiphysics® Simulation. COMSOL simulation can show inductance value, magnetic field pattern distribution. The coil is made of a solenoid using a wire of 0.8 mm in diameter, the number and length of windings of 50 and 48 mm respectively. Overall difference of inductance value in simulation with experiment is 0.017 mH. With an input of 10 Volt, the maximum and minimum distance of each coil are 2 cm and 11 cm respectively. The working frequency of the coil system is 5 MHz. The coil system is capable of distinguishing ferromagnetic and non-ferromagnetic materials in the form of paraffin, paraffin and iron mixture, iron and steel. Coil system is able to distinguish the defect condition of a hole with a diameter of 16 cm with a distance between coils 4 cm.

Keywords: Coils, Magnetic field induction, eddy current.