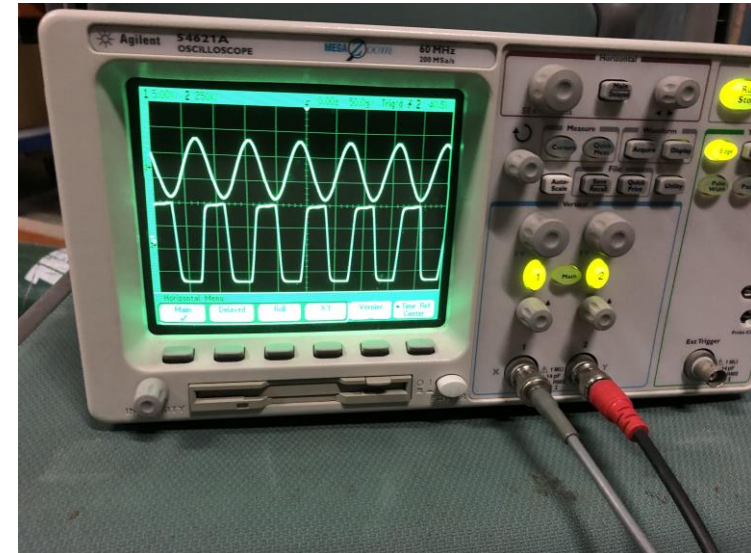
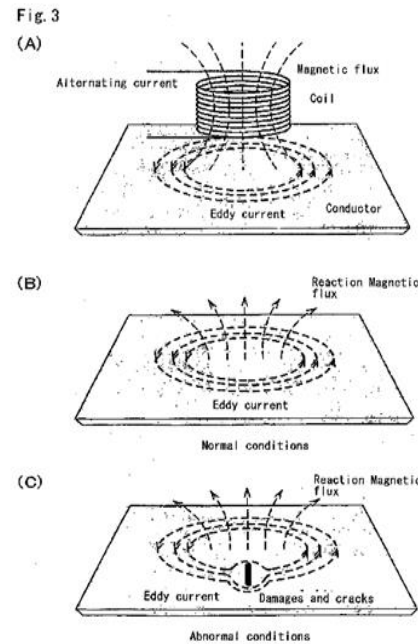
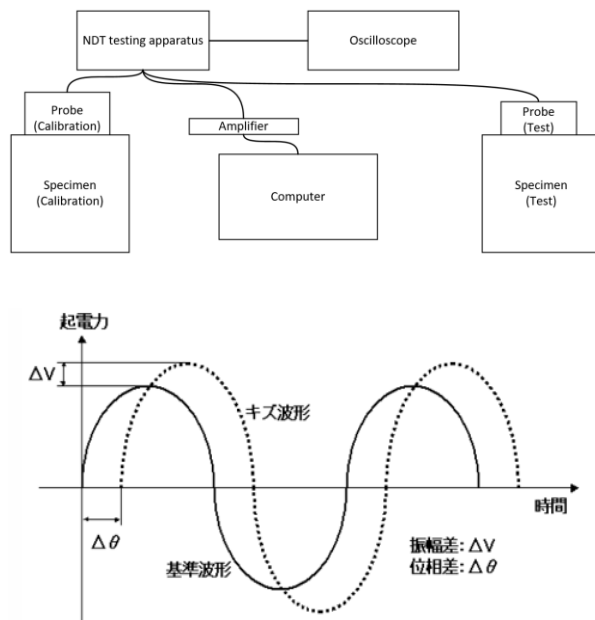


Research Introduction

Theme: Development of a nondestructive detection method for non-corroded sectional area of rebars in damaged reinforced concrete by electromagnetic induction theory

Research Purpose : Evaluate the non-corroded sectional area of steel bars by electromagnetic induction method.

Theory: The magnetic force which is generated in the primary (sending reference signal) coil, penetrates a test piece and returns to the secondary (received detective signal) sensor coil again. Uneven phase such as various sectional area of steel bars in the test piece will have an effect on the secondary induced current in the sensor, and the amplitude (current density) and phase difference will also be changed, which could be parameters for non-destructive detection.



Research Introduction

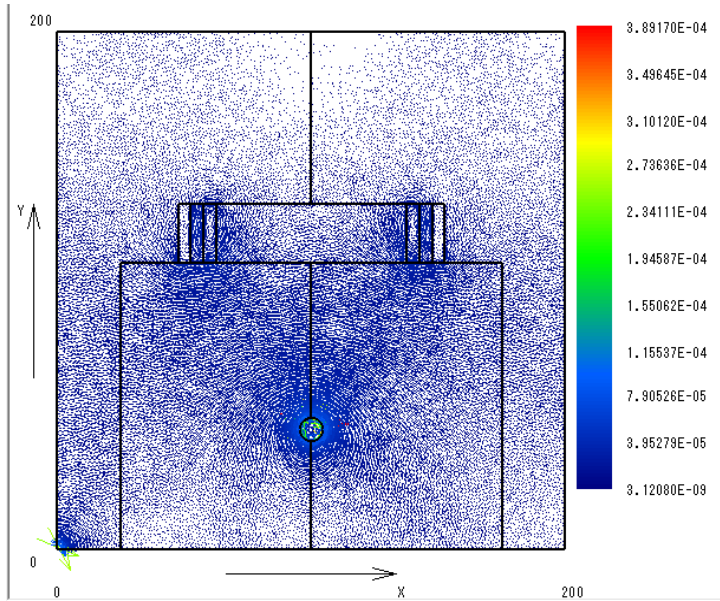


Figure 1 Magnetic vector of steel bars under the magnetic induction sensor (d=9mm cover depth=40mm frequency=3kHz)

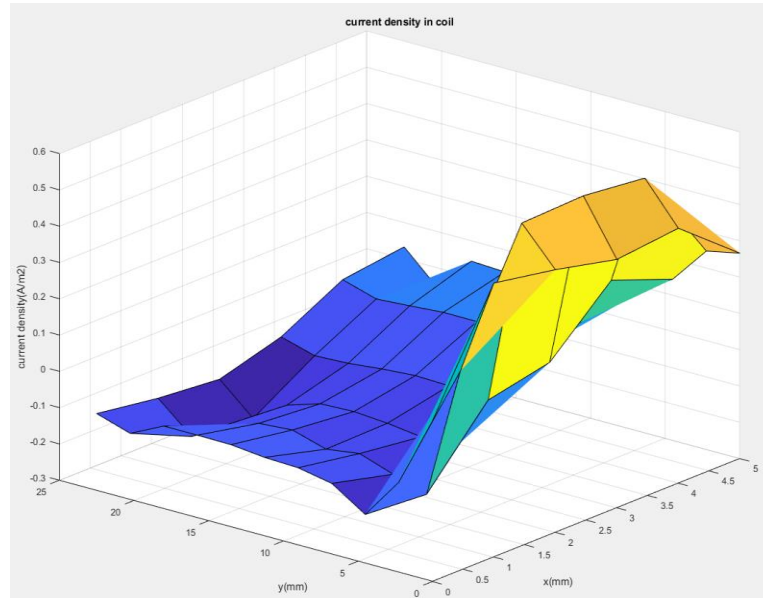


Figure 2 Secondary induced current density in sensor(d=9mm cover depth=40mm frequency=3kHz)

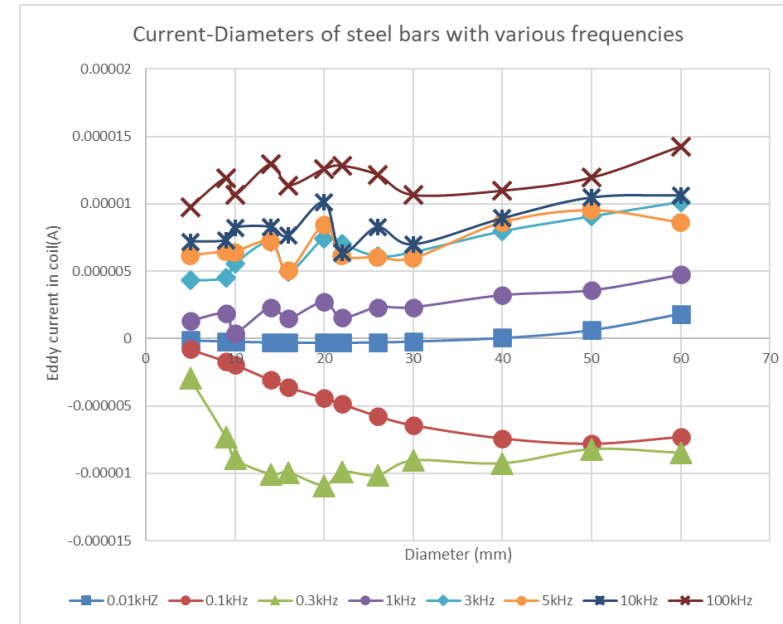


Figure 3 Various secondary induced current in sensor(d=9mm cover depth=40mm frequency=3kHz Sectional area of sensor is 22.5mm²)

0.4kHz Amplitude-Time

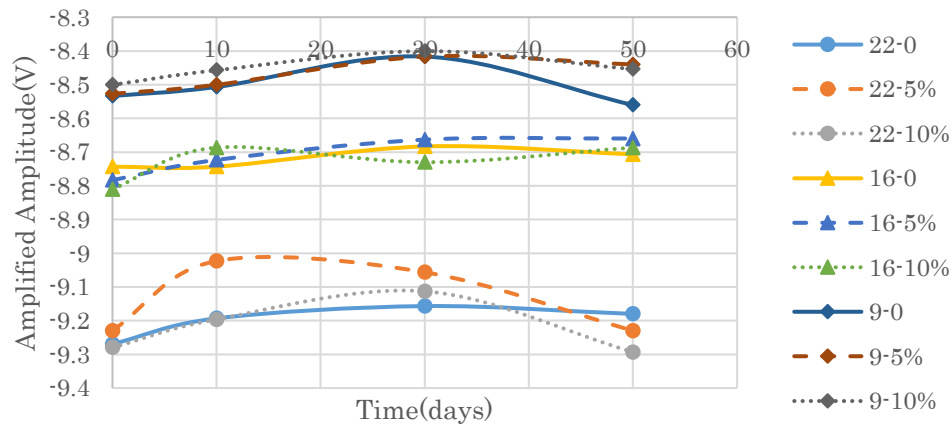


Figure 4 Amplitude(Current difference) difference of various sectional area of steel bar in experiment

Simulation and experiment: Finite element method is applied to calculate the affection of variable parameters (such as input frequency, cover depth, moisture of reinforced concrete, corrosion progress and dimension of sensor) on secondary induced current. Electromagnetic induction experiment is also applied on steel bars with various sectional area.

Result: The input current with low frequency is sensitive to sectional area and could be applied as a detection method when all the distortions are removed