
1 2nd Year Civil Engineering

NDT – Lecture 4

2 Eddy Current Testing

2.1 Basic Principles

- If a conductor is placed in an alternating magnetic field, electrical currents will be induced in it
 - These **Eddy Currents** can be used in nondestructive testing
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3 Eddy Current Testing

3.1 Factors Influencing Induced Currents

- Magnitude and frequency of the alternating current producing the alternating magnetic field
 - Specimen properties:
 - Conductivity
 - Magnetic Permeability
 - Shape/Geometry
 - Distance between coil and specimen
 - Relative orientation of coil and specimen
 - Presence of discontinuities (defects)
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4 Eddy Current Testing

4.1 Detection

- Magnitude of eddy currents affects the apparent impedance of the coil (to Alternating current, since inductance changes)
 - Can design as a GO/NO-GO test
 - Most sensitive to near-surface discontinuities
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- Possibly difficult to interpret result
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5 Eddy Current Testing

5.1 Applications

- Metal sorting
 - Composition
 - Microstructure
 - Thickness measurement
 - Crack and flaw detection
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6 Eddy Current Testing

6.1 Test Coils and Probes

- Encircling coil
- Surface coil
- Inside (bobbin) coil
- Single coil (absolute measurement)
- Double coil (differential measurement)

Different coils or probes produce different shaped magnetic fields, and thus test different parts of a component.