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# 1 2nd Year Civil Engineering

## NDT – Lecture 4

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### 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
  - 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.