Non-destructive Method for Locating Breaks in Post-Tensioned Cables

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PT Cable Break Detection

Non-Destructive Detection of Fractures in Prestressed and Post-Tensioned Cables
The Magnetisation
The Physical Principle

The diagram illustrates the magnetic field lines around north (N) and south (S) poles of a magnet, with arrows indicating the direction of the field. The graph on the right shows the magnetic field strength ($B_x$ and $B_{tr}$) versus location in centimeters, with peaks indicating the position of breaks in the cables. The labels 'tr' and 'ax' likely correspond to specific measurement axes or orientations.
Auswertung der Messdaten

Addition / Subtraktion

FFT-Filter

Korrelationsfunktion

Location of fracture

$A_{pp}$ / (arbitrary units)

Measuring path / cm
The Fracture Signal

The signal depends on:

- the number of fractures
- the concrete cover
- the location of the fractures
- the fracture width
The Applications on Full Size Units
The Applications on Full Size Units
Messung von der Seite
The Applications on Full Size Units
Impulse Magnetisation with Scanner
Scanner Functional Principle
Scanner Functional Principle

High-Speed, High-Resolution Magnetic Flux Leakage Inspection of Large Flat Surfaces

- Rotating Sensor Array

overlapping tracks → calibration “on the fly”

simple image reconstruction by vector mapping into Cartesian system
Laboratory Results
Span 2 – 43W – 42W
Span 5 – 40W – 39W
FHWA Testing
LEHIGH UNIVERSITY TESTING
For Pennsylvania DOT
Magnetic Flux in mT

fracture

fracture

fracture

Measurement Length in m

0 50 100 150 200 250 300 350 400
PT Cable Break Detection

Summary

• Non Destructive Method for detecting breaks in Prestressed and Post-tensioned cables

• Line Scan for single cable sets

• Rotating Scan for multiple cable sets
Thank You

Questions