

# Development of Pulsed Magnetic Flux Leakage (PMFL) system for defect characterization

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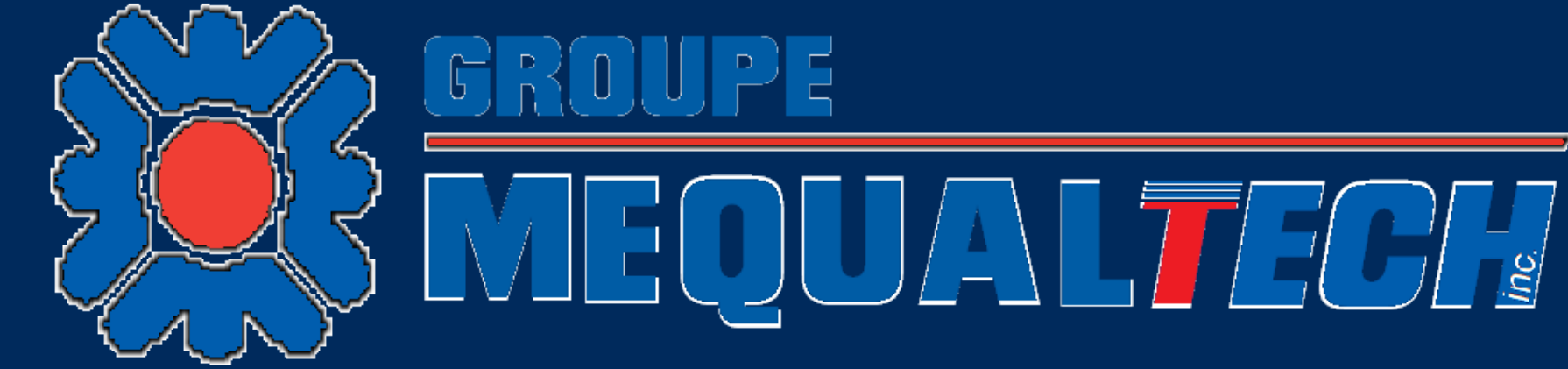


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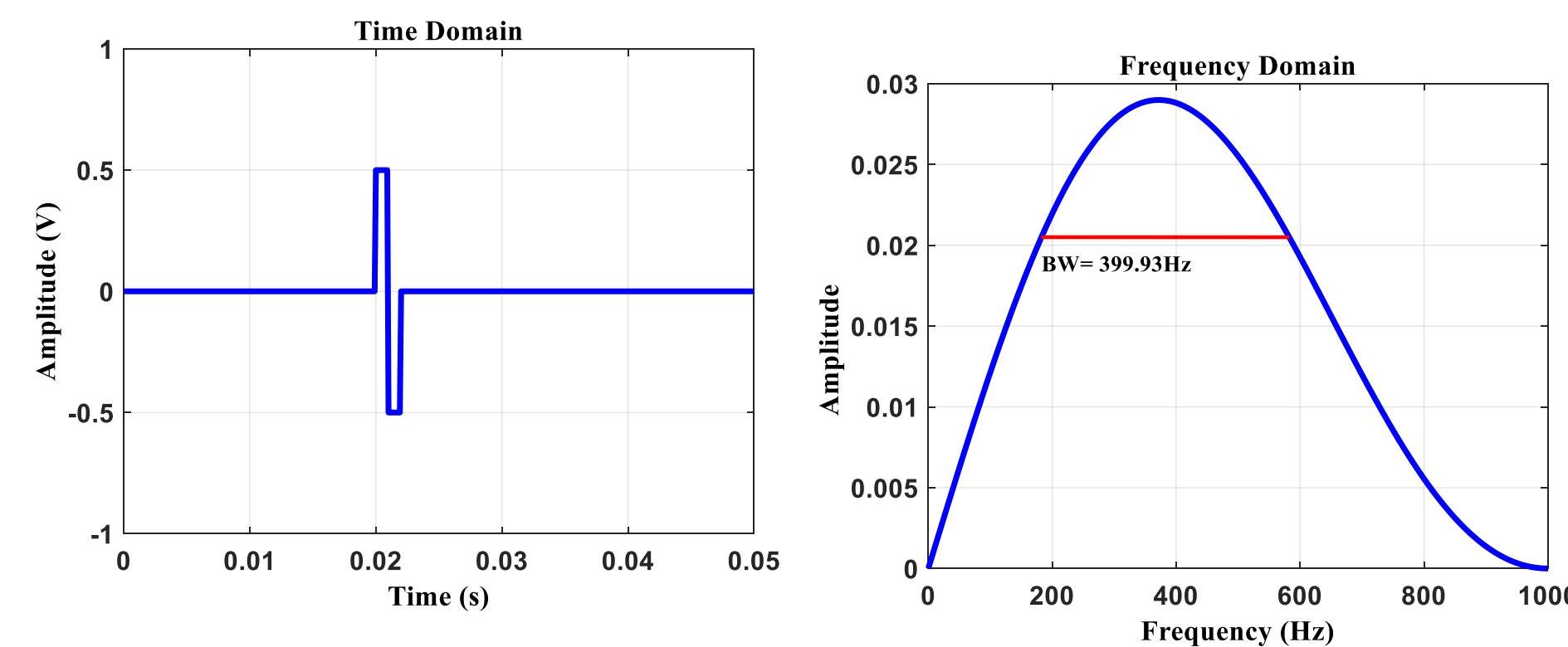
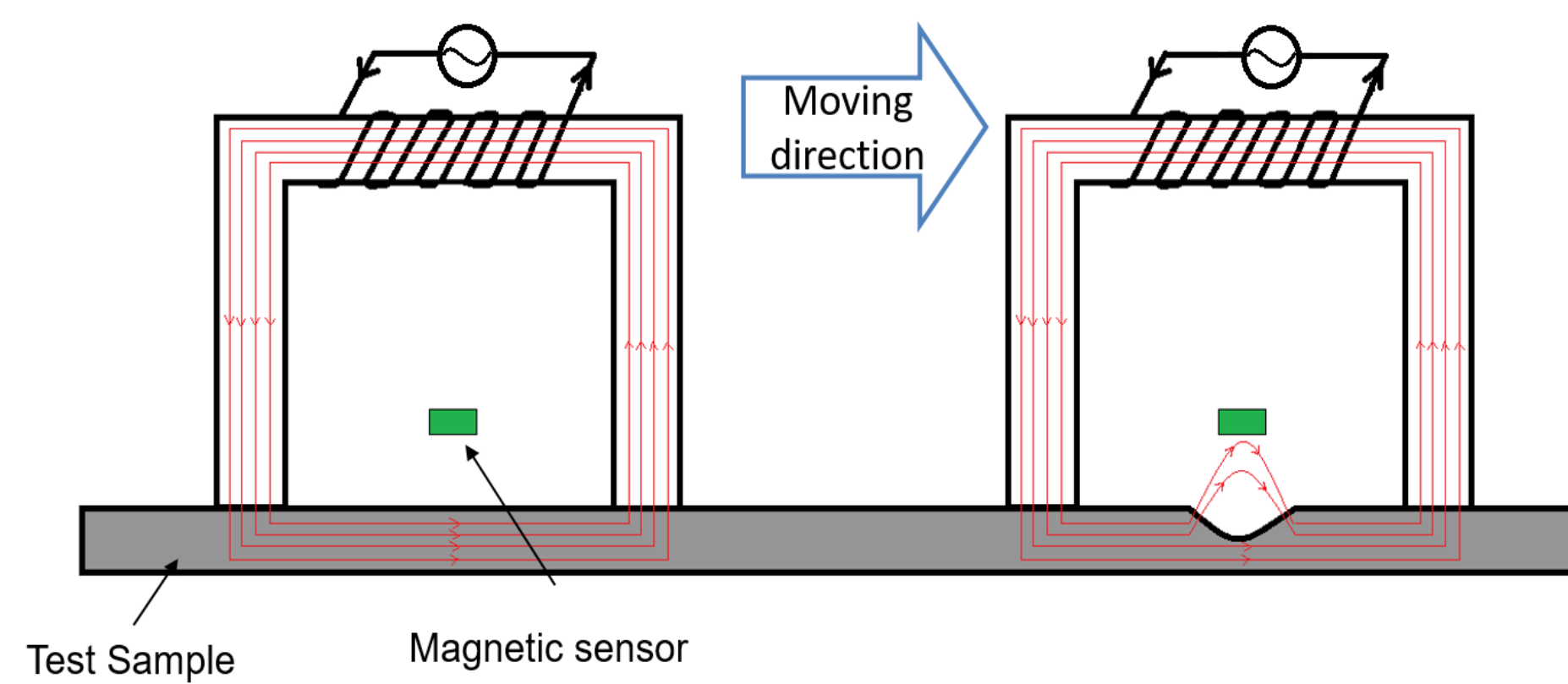


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## Background

Pulsed magnetic flux leakage (PMFL) uses pulsed signals to create a magnetic field in a test sample. PMFL gives more information about a defect compared to the conventional MFL via time and frequency domain analysis.

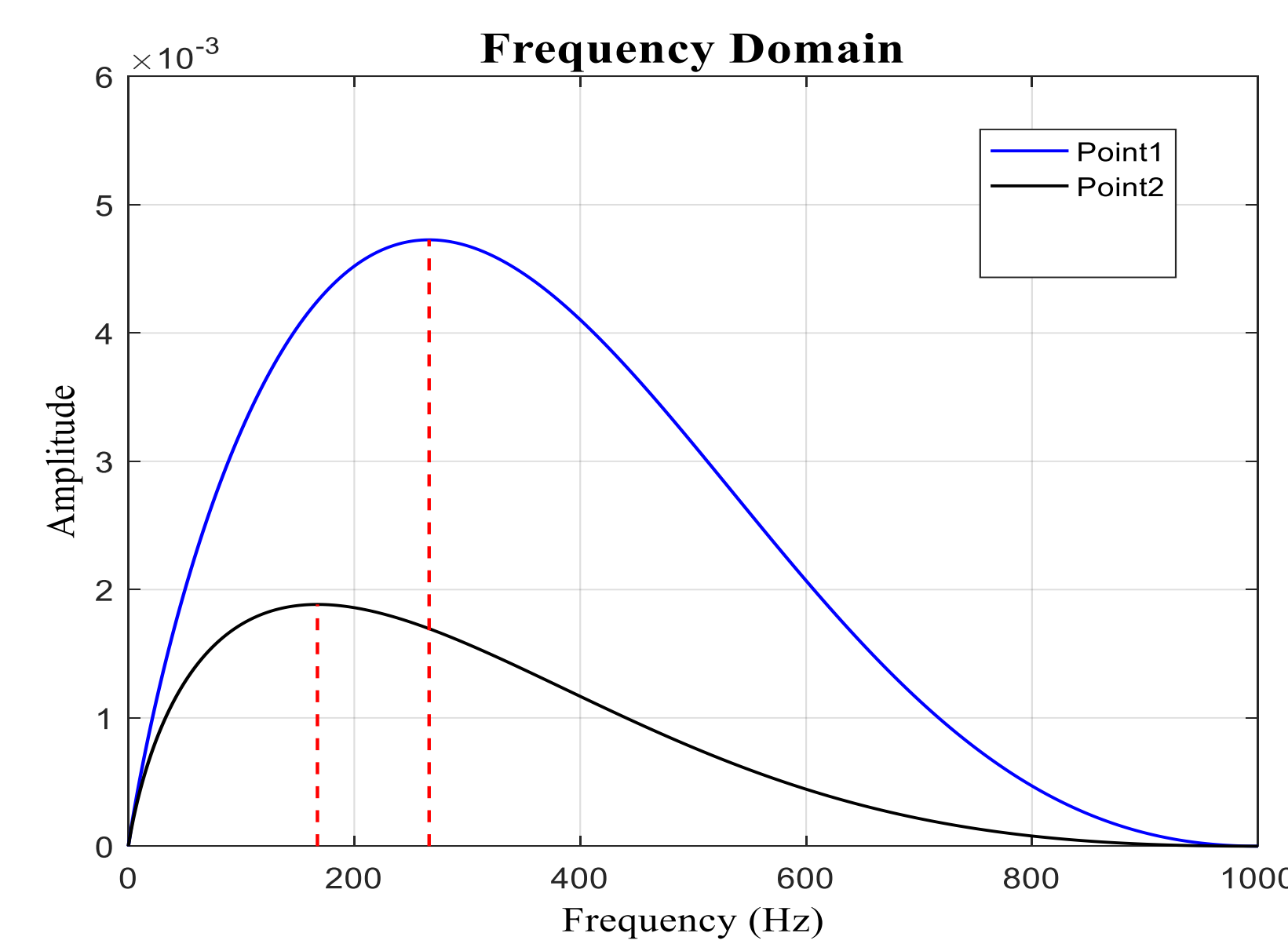
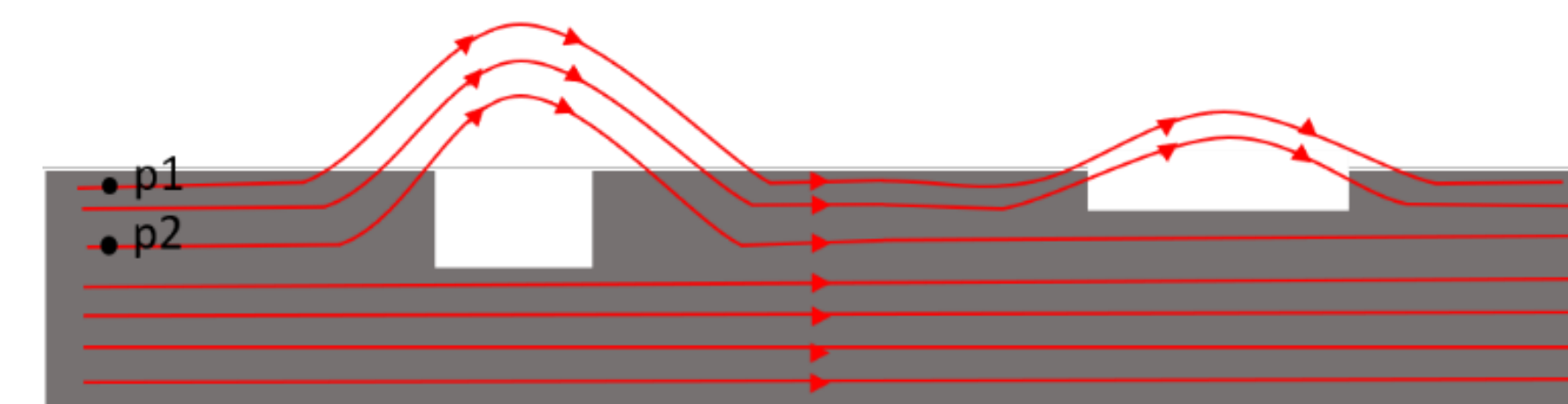


## Objectives

- ✓ Devise a PMFL technique to estimate the remaining thickness of a steel plate that does not depend only on signal amplitude.
- ✓ Devise a PMFL technique to distinguish defects that have the same volume but different depths and widths.
- ✓ Devise a PMFL technique to distinguish near-side from far-side defects

## Method

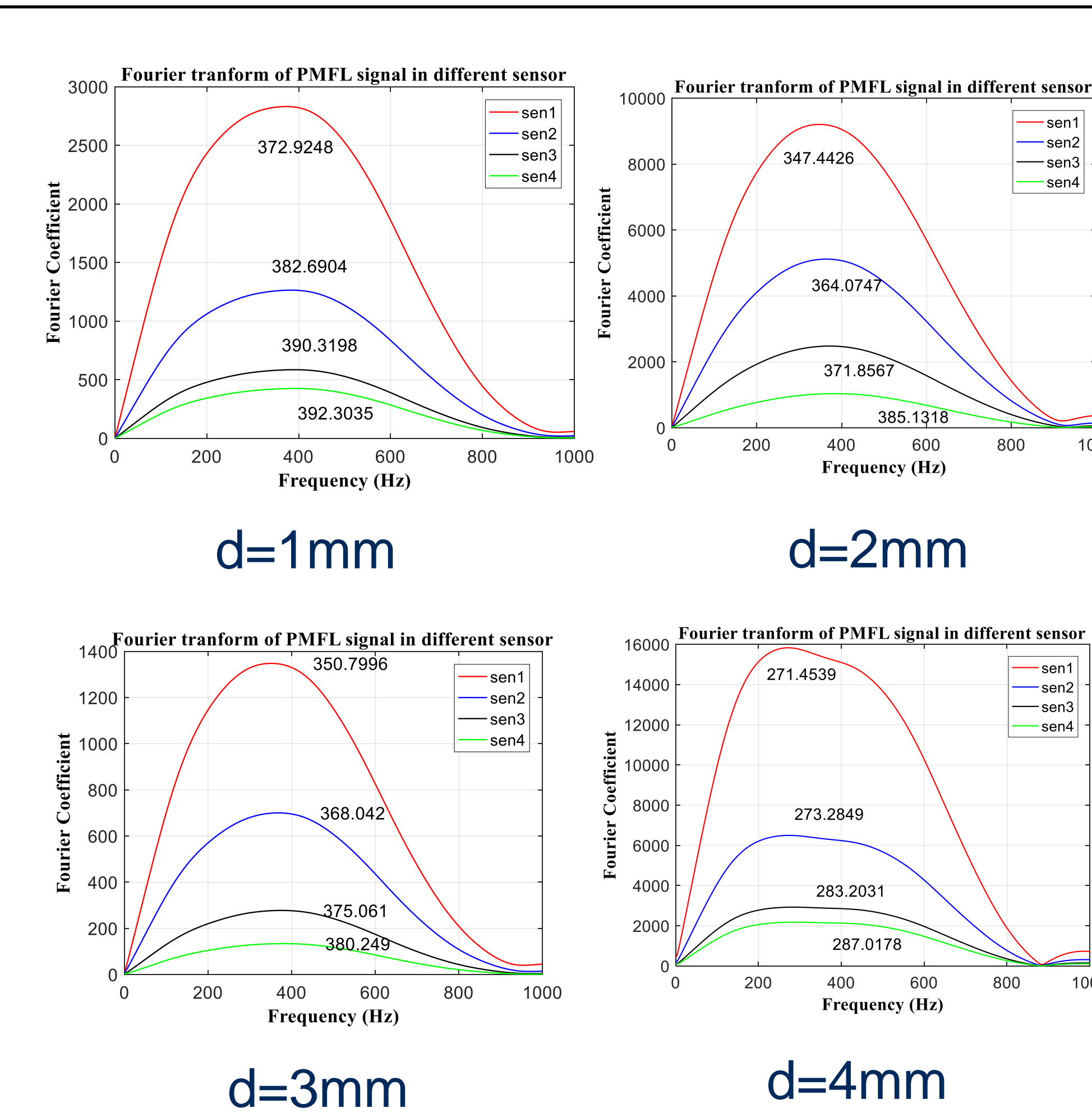
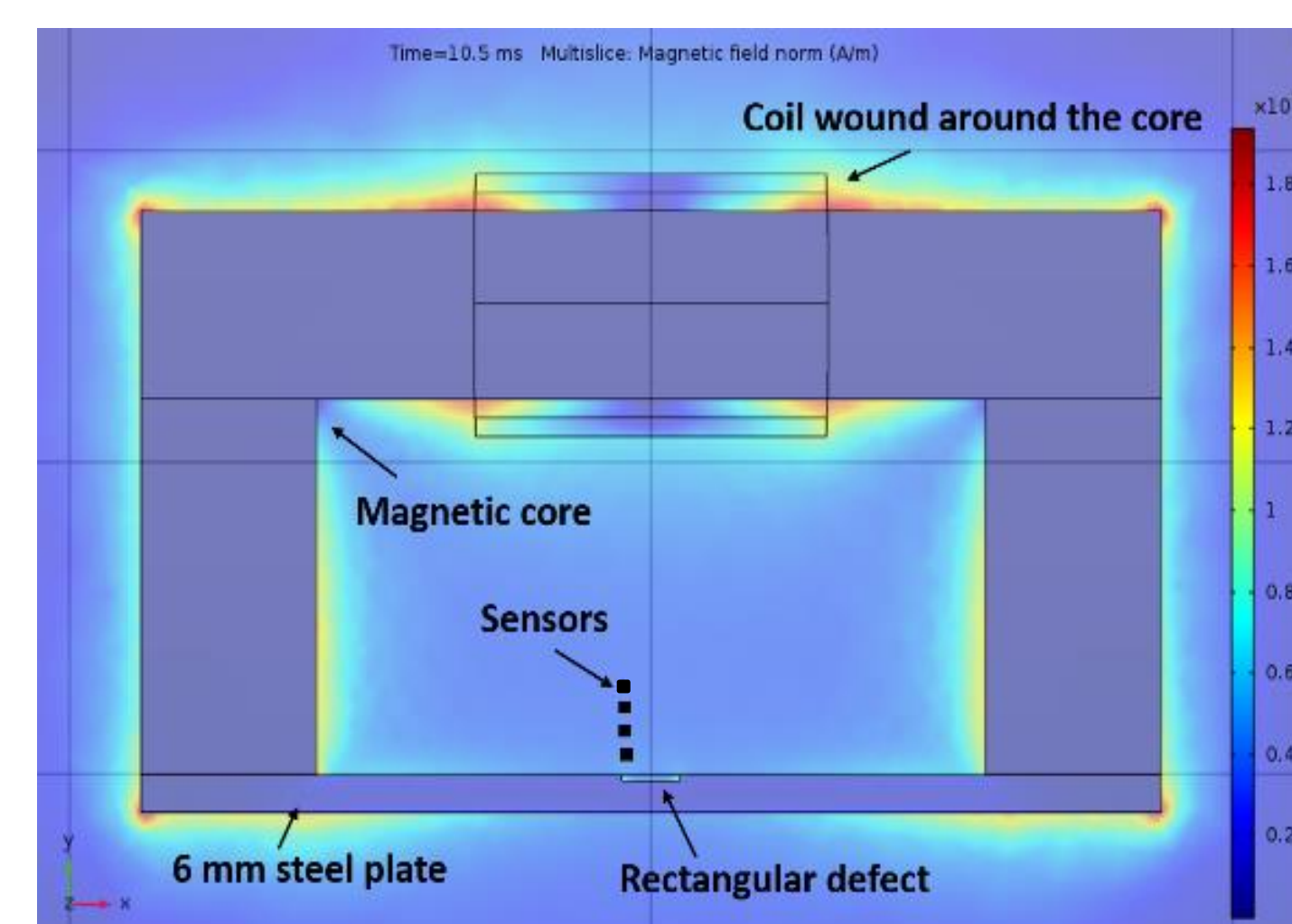
Frequency spectrum and spatial distribution of magnetic flux leakage depend on flaw size and shape.



By measuring the magnetic field intensity vs sensor lift-off, frequency spectrum indicates defect depth.

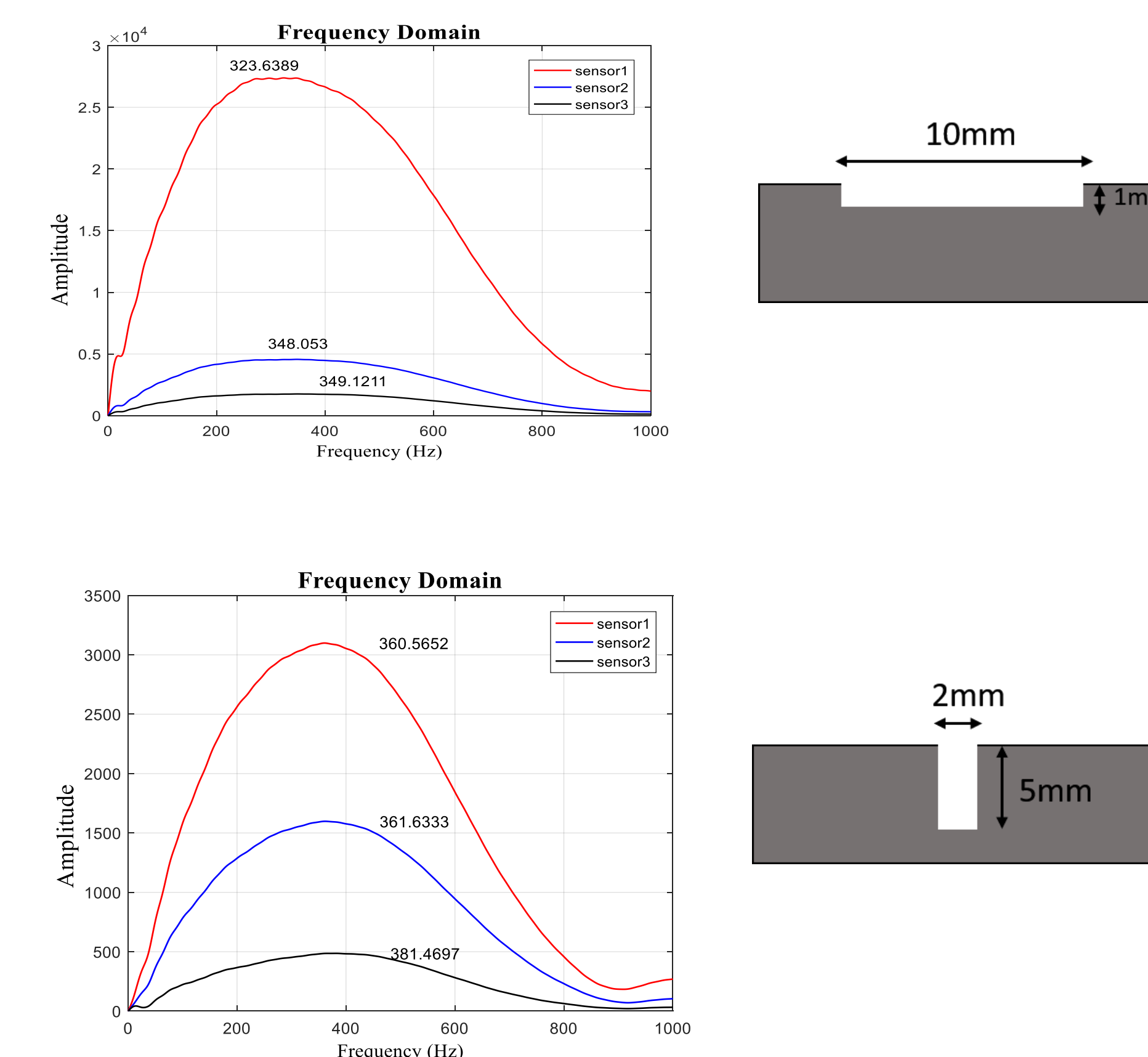
## Results

### PMFL results vs defect depth

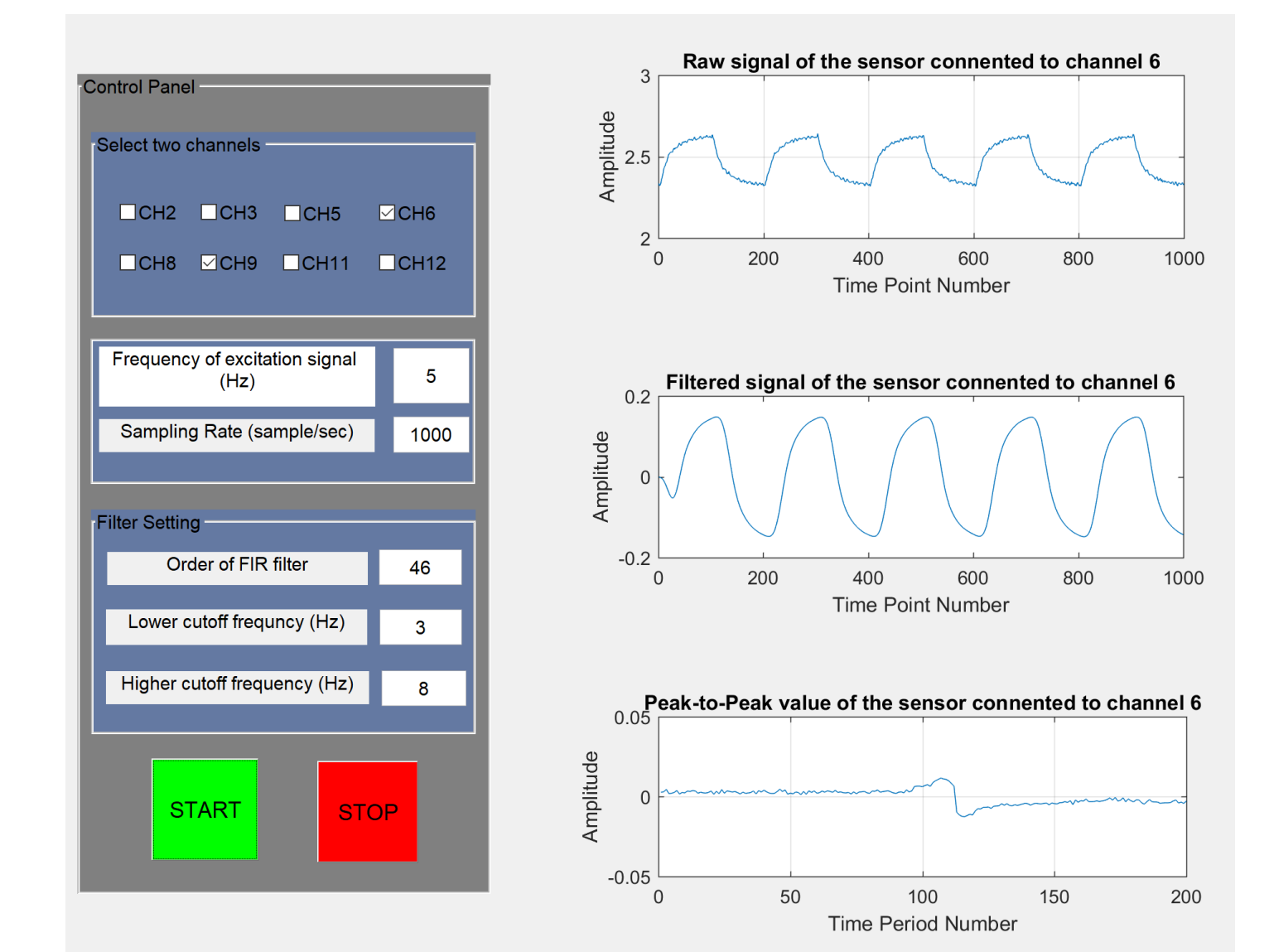
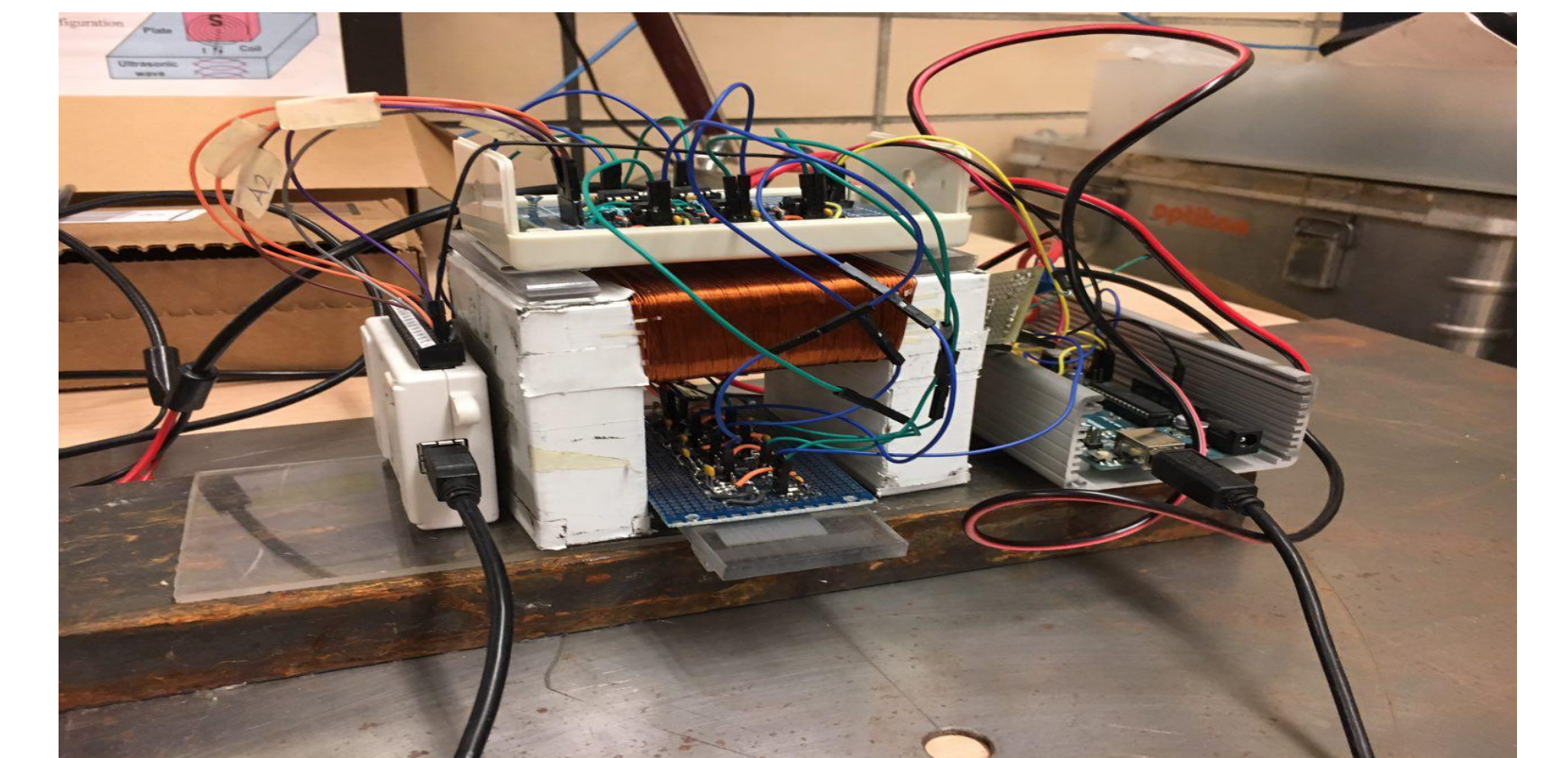


The central frequency of PMFL decreases as the sensor lift-off increases. PMFL central frequency varies inversely with defect depth.

⇒ Two defects with same volume but different depths and widths have different center frequencies.



## PMFL prototype



## Future work

- Determine the pulse shape and the optimum frequency band for pulsed MFL system.
- Estimate the remaining thickness of corroded steel plate by using signal processing method in both time and frequency domain
- Manufacture a new PMFL system to estimate the remaining thickness in a steel plate and distinguish near-side from far-side defects

## Acknowledgement

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