Processing the NDE Defect Scanner Signal

A PRESENTATION BY:
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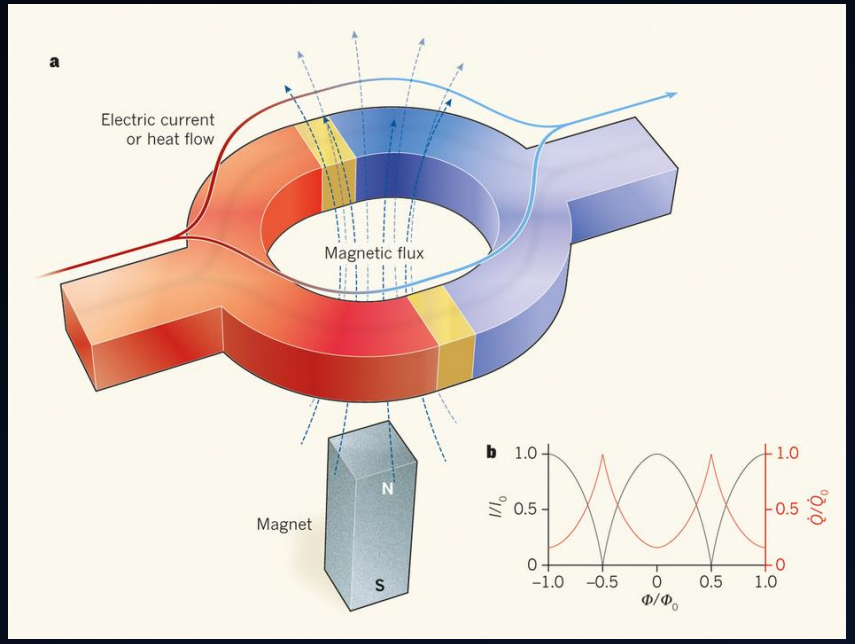
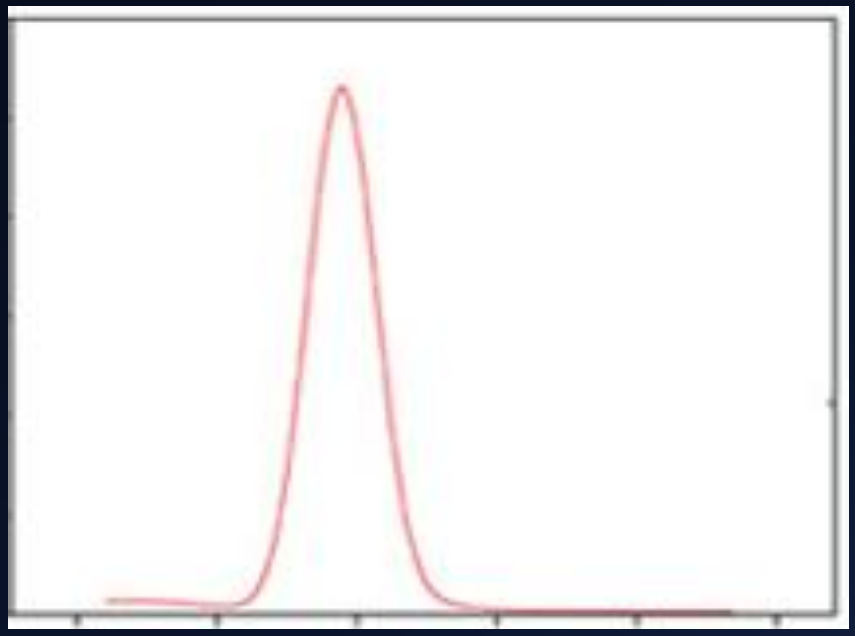
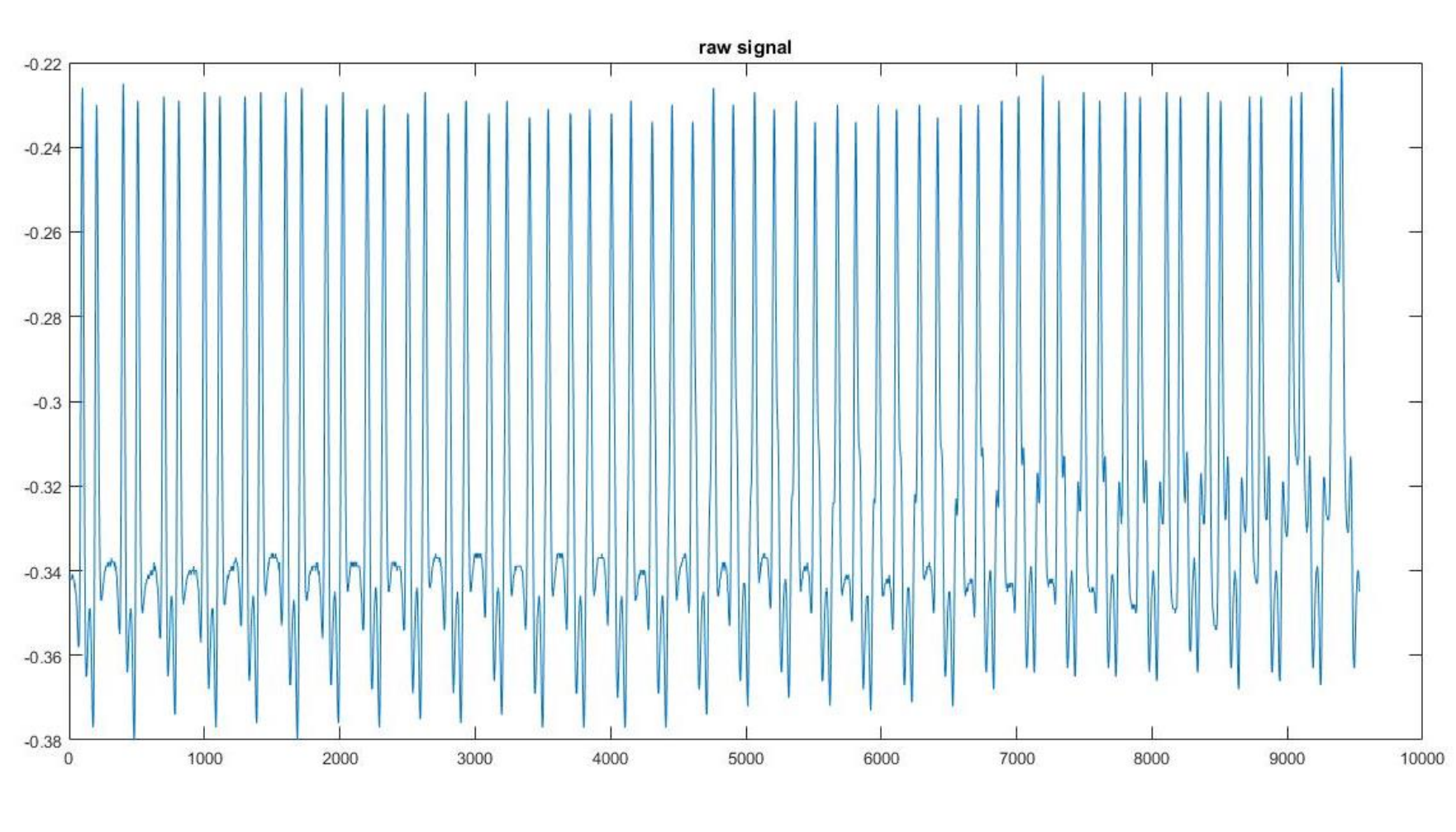
Scanner

- NDE Scanner
- Using SQUID
- How it works?



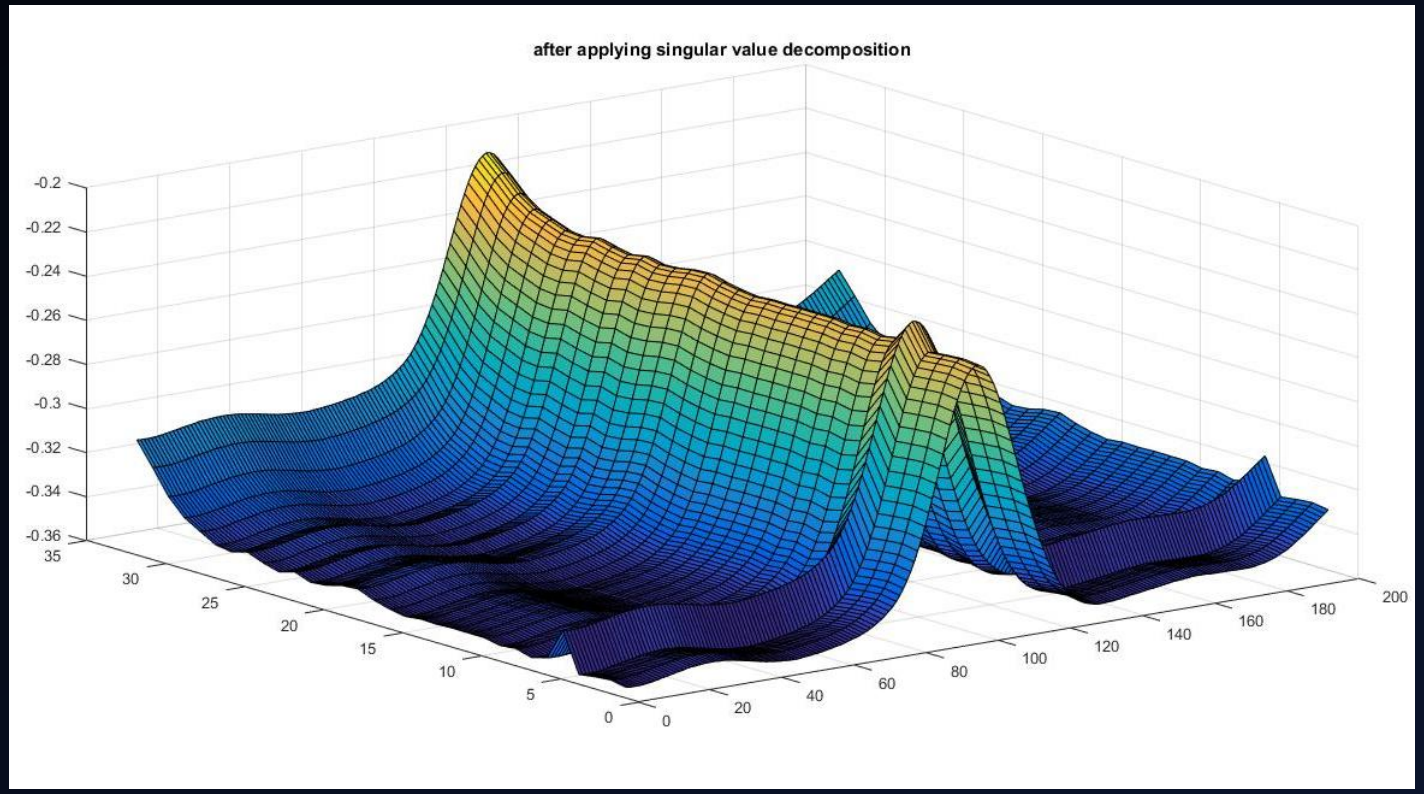


Raw signal


raw signal
-0.22
-0.24
-0.26
-0.28
-0.3
-0.32
-0.34
-0.36
-0.38
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000

Goal

- Obtain the 2D image of the defect



What to do?

- Characteristics
  - Samples per scan
  - Unlocked data
  - Peaks when meets the cut

Failed approaches

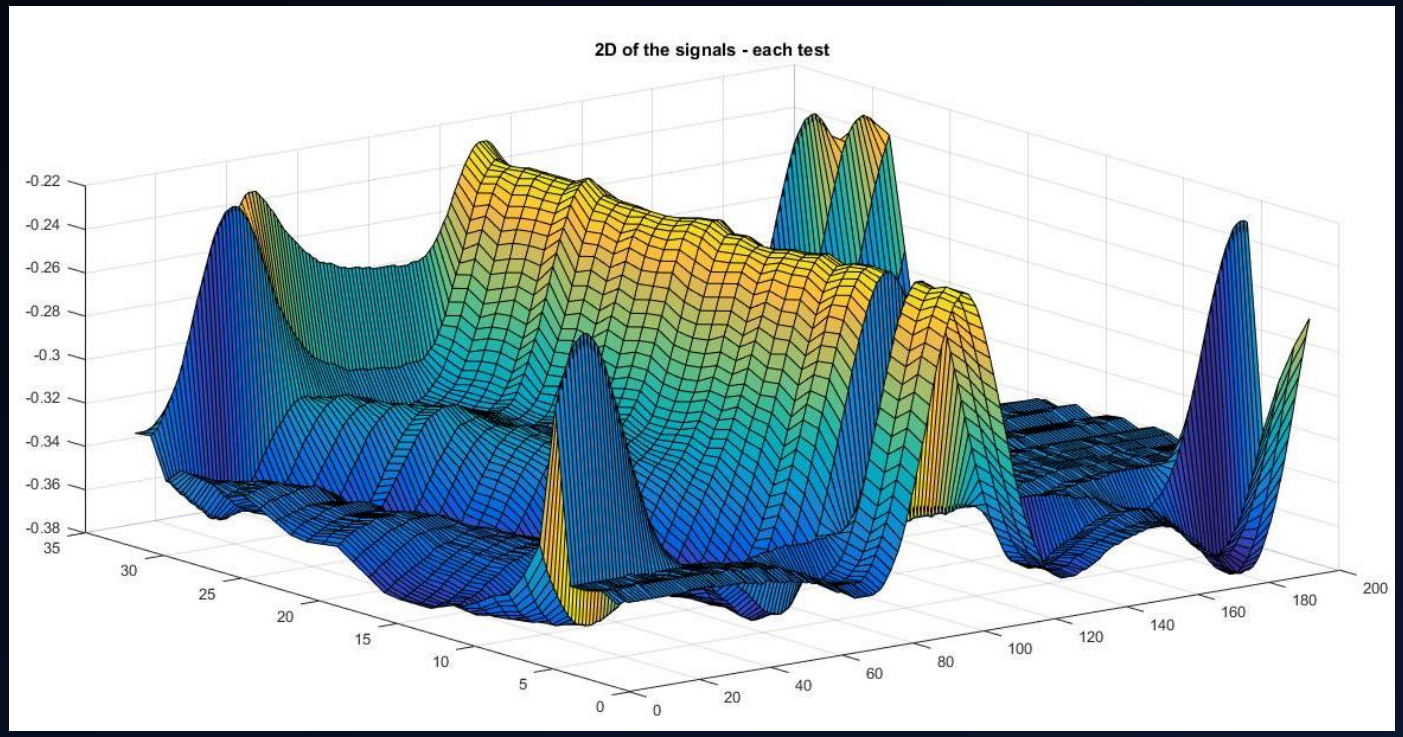
- PCA
- ICA
- Many more..

Final approach – First Step

- Clean the raw signal
- image
  - Unlocked data
  - Mean = 0

Final Approach – Second step

- Convert to 2D
  - Peak detection: sample per scan
  - Peaks under the same location



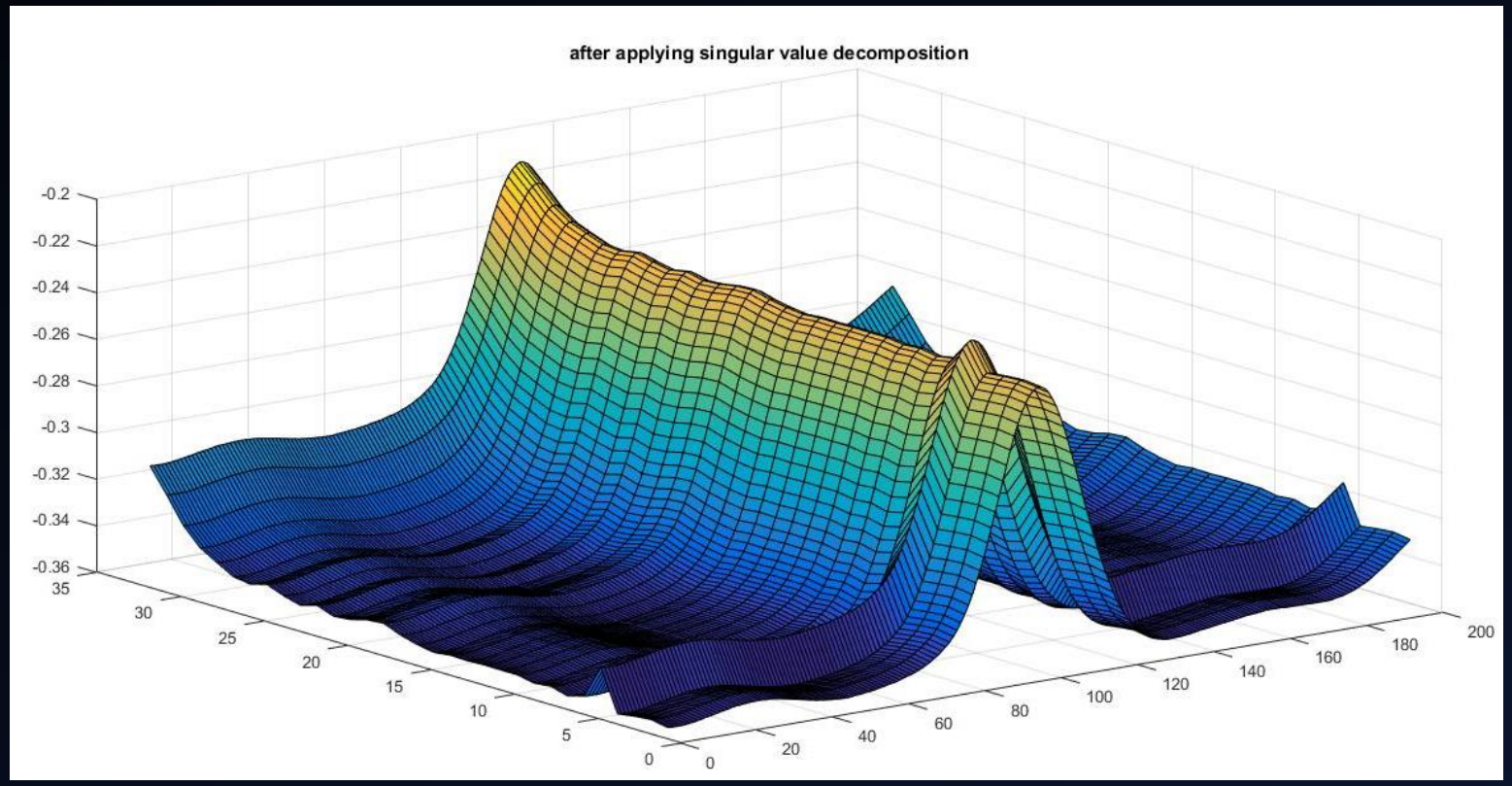
Final Approach – Final Step

- De-noise
  - SVD
- What is SVD?

$$A = U\Sigma V^*$$
$$U \,\&\, V \; are \; unitary \; matrices$$
$$\Sigma \; is \; diagonal \; - singular \; values$$

- How can we use it for de-noising?

Results


after applying singular value decomposition
-0.2
-0.22
-0.24
-0.26
-0.28
-0.3
-0.32
-0.34
-0.36
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200

What to do next?

- Find a criteria to measure the performance of the algorithm
- Different depths

Thank you for your time and attention