

Gradient-based level-set reconstruction of a 3D-defect embedded in a non-magnetic material using eddy-currents

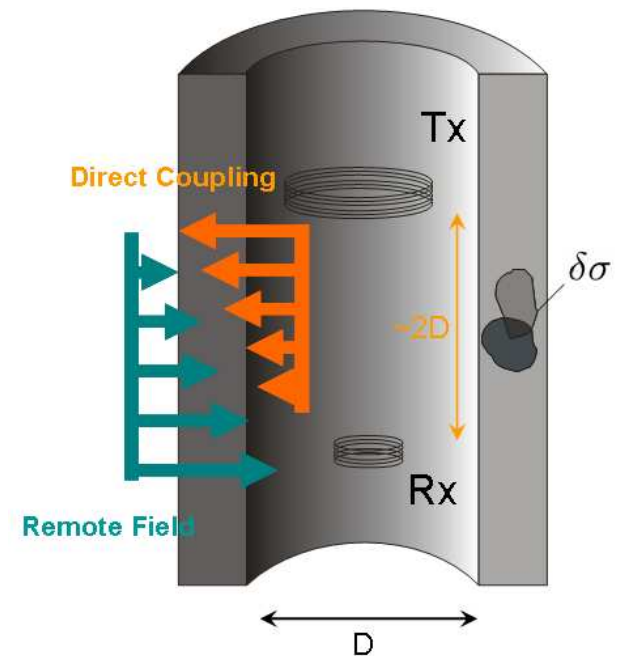
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Motivation

- **Eddy Current Testing** widely used for quality examination of highly conductive material during manufacturing in steel industry.
- **Goal: Detect 3D-void-defect** using eddy currents.
- **Direct problem** solved by volume integral formulation and Method of Moments (CIVA platform).
- **Shape reconstruction** by evolution of a **level-set** function with gradient-based algorithm where analytical gradient is given by direct and adjoint problems.



Results

Exact (left) and reconstructed (right) defects for two different depths.

- Tube of interior and exterior radius 23.32 and 31.90 mm.
- $\sigma = 1.43 \text{ MSm}^{-1}$.
- Frequency 2.4 kHz.
- Skin depth $\delta = 8.58 \text{ mm}$.
- RoI: $15 \times 15 \times 15$ voxels.

