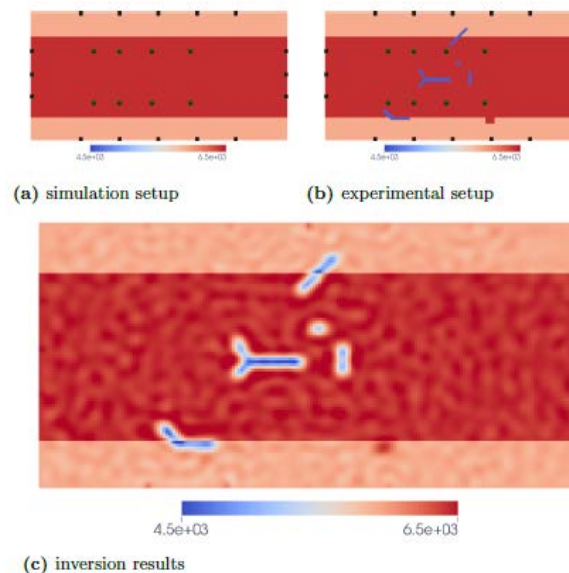


(103)

## Acoustic Full Waveform Inversion for Ultrasonic Flaw Identification

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Ultrasonic NDT is concerned with detecting flaws inside components without causing physical damage. It is possible to detect flaws using ultrasound measurements but usually no additional details about the flaw like position, dimension or orientation are available. The information about these details is hidden in the recorded experimental signals. The idea of Full Waveform Inversion is to adapt an initial simulation model of the undamaged component by minimizing the discrepancy between experimentally measured and simulated signals. Commonly, it is applied on a larger scale to infer mechanical properties of the earth in seismology [1]. We propose to use acoustic full waveform inversion for structural parameters to visualize the interior of the component. The method is adapted to US NDT by combining multiple similar experiments on the test component as the typical small amount of sensors is not sufficient for a successful imaging. It is shown that the combination of simulations and multiple experiments can be used to detect flaws and their position, dimension and orientation in emulated simulation cases. (Fig. 1)



**Figure 1.** Detection of multiple damage using 16 sensors and eight experiments. An initially undamaged model is adapted iteratively. The result provides a clear image of all damage.

### References:

1. A. Fichtner, “Full Seismic Waveform Modelling and Inversion” in *Advances in Geophysical and Environmental Mechanics and Mathematics*, Springer, Heidelberg, 2011