

Popular science summary of the PhD thesis

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Title of the PhD thesis	<u>On Modelling, Optimization and Uncertainty in Acousto-Electric Tomography</u>
PhD school/Department	<u>Department of Applied Mathematics and Computer Science</u>

Science summary

Tomography with electricity and ultrasound

How can you determine the internal structure of an object without breaking it apart? The answer lies in the indirect imaging of tomography. Tomography is about determining some physical property of an object by measuring the effect caused by said property.

In acousto-electric tomography the physical property in question is conductivity; a measure for the ease with which electric current flows. By running electrical currents through the object and measuring the potentials generated at the surface of the object its conductivity can be estimated. However, due to the nature of electricity such estimates suffer from blur. Here enters acoustics, which (somewhat unintuitively) can help mitigate the blur through ultrasound.

Mathematical models describe the behaviour and interaction between electricity and ultrasound waves and link the conductivity, controls and measurements. Such a model works within certain constraints and in this project we develop theory and numerical methods to explore those boundaries.

We ask the questions and attempt to answer: What happens if the electrical properties of an object are less nicely behaved (mathematically)? How well do we need to know the ultrasound wave to use the model? And can we still get an image if we can only access a part of the surface of an object?

Please email the summary to the PhD secretary at the department