Report on

A Direct Imaging Method for Half-Space Inverse Elastic Scattering Problems

by Z. Chen and S. Zhou

The work is devoted to an inverse elastic scattering problem. By a modification of the so called reversed time migration method a scattering obstacle should be imaged from elastic field data generated by point sources on a prescribed surface and also measured on that surface.

The authors start with an introduction describing the direct scattering problem and their suggestion for an imaging functional. In view of verifying the method the second section shows certain asymptotic estimates for the elastic Greens functions. Then the next chapter considers the point spread function and analyses its connection with the suggested imaging function of the method. A main tool for these quite technical estimates is the Van de Corput result cited in Lemma 2.4. Unfortunately it is not always clear at least to me, whether all requirements for an application are satisfied. For instance the assumption $\lambda \geq 1$ in equation (3.7) or the condition $u' \geq 1$ on the whole interval $[0, \pi]$ in the proof of Theorem 3.2.

In the following chapter the authors introduce and discuss the reversed time migration idea for the elastic problem. Modifications of the method in case of different boundary conditions are mentioned in the following chapter. Then the next chapter presents some numerical results which illustrate the performance of the approach. We may conclude that at least the illuminated part of a scattering obstacle can be visualized by the imaging functional. An appendix, finally, is added for completion of the proof of Theorem 4.2.

Overall, the paper extends already published results on the RTM method by the authors and therefore contributes to a more complete understanding of the idea. Thus, from this perspective it is worth to be published. But, according to the problems in applying Lemma 2.4, mentioned above, to me the presented work requires a revision before publication. Some additional minor remarks and misprints are listed below.

- p4, l6: I guess, it should be "... limit of $(z + I\varepsilon)^{1/2}$ as ..."
- p4, eq (2.7): β is used twice, as summation index as well as a function.
- p9, eq (2.17): a definition of d is missing