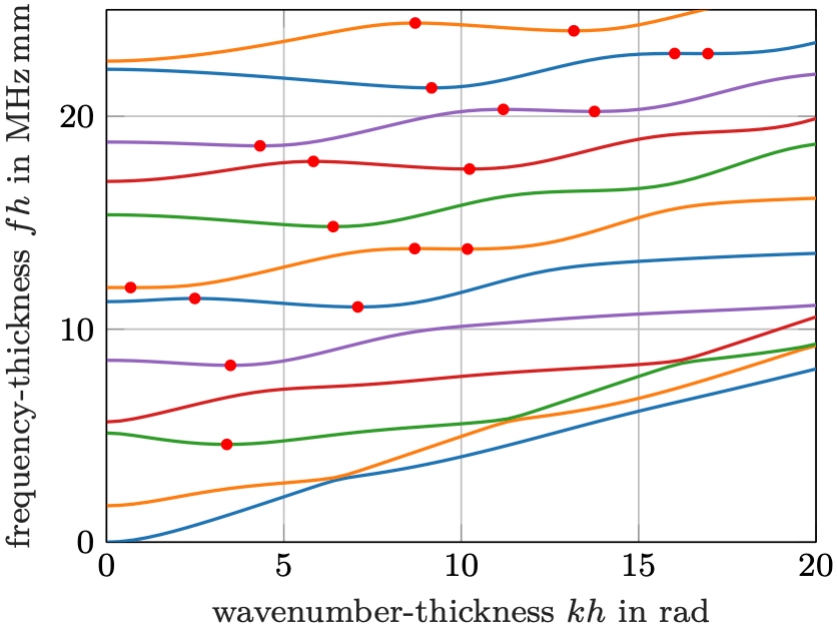
GEW ZGV computation DOI 10.5281/zenodo.7537441

Compute zero-group-velocity (ZGV) points of guided elastic waves (GEWs).

Three different computational techniques to locate ZGV points on dispersion curves are implemented. They are all based on the discretized waveguide problem.

- **Newton-type iteration:** super fast but needs initial guesses.
- **Method of fixed relative distance (MFRD):** scans a wavenumber interval without initial guesses and is likely to locate all ZGV points but is substantially slower. It refines computed approximations with the Newton-type iteration.
- **Direct method:** does not need initial guesses and guarantees to find all ZGV points. It is slow and can, therefore, only be used with rather small matrices.



Code repository: https://github.com/dakiefer/gew_zgv_computation

The methods have been presented in:

> D. A. Kiefer, B. Plestenjak, H. Gravenkamp, and C. Prada, “Computing zero-group-velocity points in anisotropic elastic waveguides: Globally and locally convergent methods,” The Journal of the Acoustical Society of America, vol. 153, no. 2, pp. 1386–1398, Feb. 2023, doi: 10.1121/10.0017252

How to use

1. Change into the `GEW_ZGV_computation` folder or add it to the Matlab path.
2. Execute `example.m` . Enjoy!

Dependencies

The *direct method* is based on the solver for singular two-parameter eigenvalue problems implemented by Bor Plestenjak and Andrej Muhič in `MultiParEig`:

> Bor Plestenjak (2023). MultiParEig (https://www.mathworks.com/matlabcentral/fileexchange/47844-multipareig), MATLAB Central File Exchange. Retrieved January 14, 2023.

Authors

Code created 2022–2023 by

Bor Plestenjak, Faculty of Mathematics and Physics, University of Ljubljana, Slovenia
bor.plestenjak@fmf.uni-lj.si • Follow me on ResearchGate!

Daniel A. Kiefer, Institut Langevin, ESPCI Paris | PSL, France
daniel.kiefer@espci.fr • dakiefer.net • Follow me on ResearchGate!

If this code is useful to you, please cite it as:

> B. Plestenjak and D. A. Kiefer, GEW ZGV computation [Computer software], 2023. doi: 10.5281/zenodo.7537441

and also the related publication:

> D. A. Kiefer, B. Plestenjak, H. Gravenkamp, and C. Prada, “Computing zero-group-velocity points in anisotropic elastic waveguides: Globally and locally convergent methods,” The Journal of the Acoustical Society of America, vol. 153, no. 2, pp. 1386–1398, Feb. 2023, doi: 10.1121/10.0017252

University *of Ljubljana*
Faculty *of Mathematics and Physics*

Institut **Langevin**
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