

# GEW piezo plate DOI 10.5281/zenodo.14205789

Script to compute guided waves in piezoelectric plates.



[https://github.com/dakiefer/gew\\_piezo\\_plate](https://github.com/dakiefer/gew_piezo_plate)

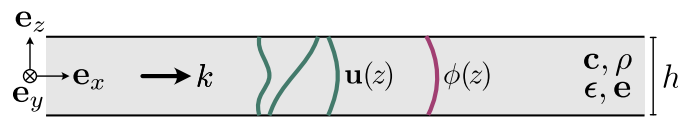
GEW piezo plate is a minimal script for fast and robust computation of guided electroelastic waves in piezoelectric plates. It implements the spectral collocation method (SCM) based on DMSUITE and is an extension to [GEW dispersion script](#). The code implements the method from

D. A. Kiefer, G. Watzl, K. Burgholzer, M. Ryzy, and C. Grünsteidl, "Electroelastic guided wave dispersion in piezoelectric plates: Spectral methods and laser-ultrasound experiments," Journal of Applied Physics, vol. 137, no. 11, p. 114502, Mar. 2025, [10.1063/5.0250494](#).

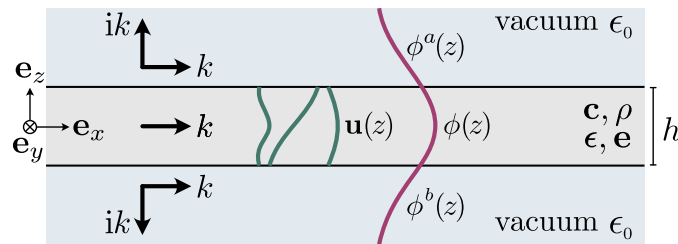
Features:

- only ~100 comprehensive lines of Matlab code
- electrically "shorted" or "open" plate surfaces
- arbitrary propagation direction

Piezoelectricity couples the mechanical displacement vector  $\mathbf{u}$  to the electrostatic potential  $\phi$ . We solve for these fields across the plate thickness as depicted in the figure below.

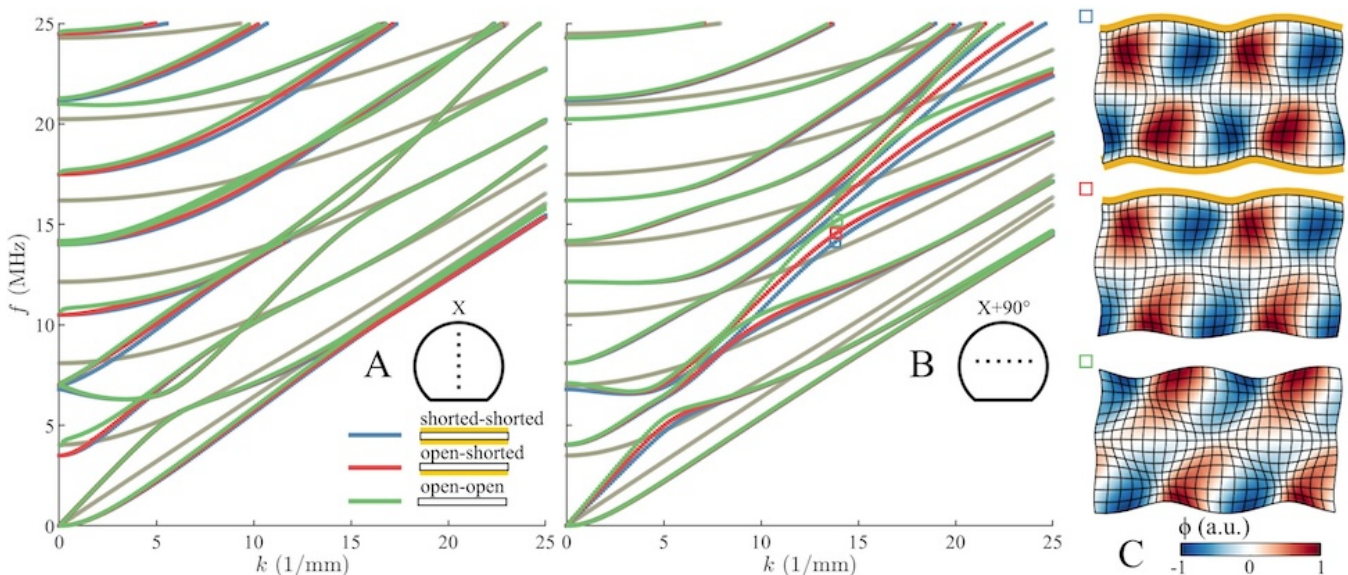


(a) electrically shorted plate



(b) electrically open plate

Computational results are depicted below in the form of dispersion curves. The wave field of three selected modes are also shown.



### Tip

This is a simple script that should be easy to extend with custom functionality. If you are rather looking for a full system to compute and postprocess guided waves, have a look at [GEWtool](#).

## How to use

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

## How to cite

If this code is useful to you, please cite the accompanying paper:

D. A. Kiefer, G. Watzl, K. Burgholzer, M. Ryzy, and C. Grünsteidl, "Electroelastic guided wave dispersion in piezoelectric plates: Spectral methods and laser-ultrasound experiments," *Journal of Applied Physics*, vol. 137, no. 11, p. 114502, Mar. 2025, [10.1063/5.0250494](https://doi.org/10.1063/5.0250494).

as well as the software itself:



D. A. Kiefer and C. Grünsteidl (2024). GEW piezo plate. <https://doi.org/10.5281/zenodo.14205789> ([https://github.com/dakiefer/GEW\\_piezo\\_plate](https://github.com/dakiefer/GEW_piezo_plate))

## Dependencies

This software bundles `chebdf.m` from DMSUITE:

J.A.C Weideman (2022). DMSUITE (<https://www.mathworks.com/matlabcentral/fileexchange/29-dmsuite>), MATLAB Central File Exchange. Retrieved August 18, 2022.

## Literature

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