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# Elastic wave propagation in structured plates

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**Abstract:** A novel concept is introduced and tested for the reduction of the scattering by faults in a flexural lattice. The majority of the relevant published work is based on the so-called "cloaking transformation", based on the idea, which initially came from electromagnetism and optics and linked to the Maxwell system of equations or, in special cases, to the Helmholtz equation [1]. In the present work, we address an elastic system and apply a different principle concerning reinforcement of the boundary and redistribution of mass [2]. We demonstrate that this approach, which is simple in nature, enables one to significantly reduce the coefficients in the multipole expansion of the scattered field. Accurate numerical simulations and quantitative analysis of the scattered fields for 'cloaked' and uncloaked faults are provided.

## References

[1] Schurig, D., Mock, J.J., Justice, B.J., Cummer, S.A., Pendry, J.B., Starr, A.F., and Smith, D.R. (2006). Metamaterial electromagnetic cloak at microwave frequencies, *Science*, 314, 977980.

[2] Misseroni, D. Movchan, A.B., and Bigoni, D. (2019). Omnidirectional flexural invisibility of multiple interacting voids in vibrating elastic plates, *Proc. R. Soc. A.*, 20190283