Erratum for "Probability that a band-gap extremum is located on the irreducible Brillouin-zone contour for the 17 different plane crystallographic lattices"

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Abstract

Maurin et al. (2018) presented an article discussing the probability that a band-gap extremum is located on the irreducible Brillouin zone contour, given the symmetry group of the lattice. To illustrate the case of a band-gap detected on the irreducible Brillouin contour, but absent when the full zone is considered, the dispersion curves of a unit cell based on the Sierpinski triangle is provided. This example has been also considered by Valencia et al. (2019), but they shown that to reproduce the curves, a different contour than the one state in Maurin et al. (2018) should be followed. Maurin et al. confirm in this erratum the erroneous contour defined in their code used to generate the dispersion curve for this example. It is also shown here that no band-gaps are detected when the correct contour is used. However, Maurin et al. specify here that this error only affects this example, such that their probabilities and conclusions remain unchanged.

Keywords: Bloch theorem, irreducible Brillouin zone, plane crystallographic group, band-gap, dispersion, porous phononic crystal

1. Observations

In the figure 4 of Maurin et al. (2018), dispersion curves of a unit cell based on a Sierpinski triangle are provided (this figure is duplicated here in fig. 1(a) with the dot lines). In Valencia et al. (2019), the same example is considered, but it is shown that a different path than the one stated in Maurin et al. (2018) should be followed to reproduce the curves (see full lines of 1(b)).

Maurin et al. confirm in this erratum that they intended to use the contour mentioned in their paper ($\Gamma X M \Gamma \bar{O} X$), but used instead in their code the

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contour $\Gamma X M \Gamma \bar{M} X$.

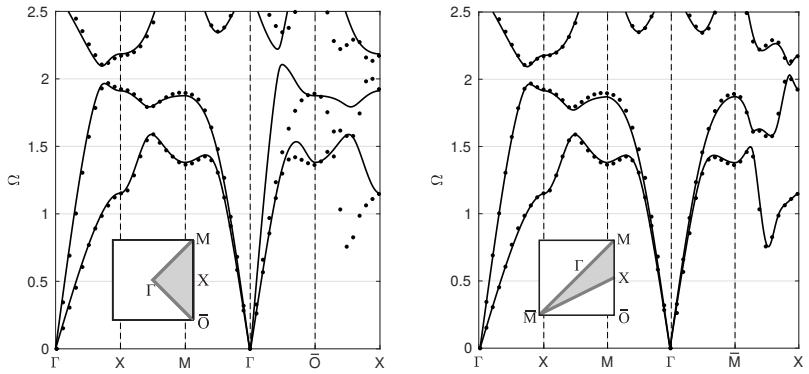

Figure 1: In full lines, correct dispersion curves around the contour $\Gamma X M \Gamma \bar{O} X$ (a) and $\Gamma X M \Gamma \bar{M} X$ (b) Valencia et al. (2019). In dot lines, the erroneous dispersion curves duplicated from Maurin et al. (2018) (a), that correspond in fact to the contour definition of (b).

The dispersion curves around the path $\Gamma X M \Gamma \bar{O} X$ that Maurin et al. (2018) intended to use are shown in figure 1(a) (full lines). It is found that when using the correct contour, no band-gap is detected. Consequently, contrary to what stated in Maurin et al. (2018), this example cannot be used to illustrate that a band-gap can be present on the irreducible Brillouin zone contour, but absent when the full zone is considered.

Maurin et al. specify in the present erratum that this erroneous contour definition was only used to generate figure 4 of Maurin et al. (2018), and does not affect the rest of their paper. Moreover, the second example in section 3.2.2 of Maurin et al. (2018) is used to also illustrate that a band-gap can be present on the irreducible Brillouin zone contour, but absent when the full zone is considered. Consequently, the probabilities and conclusions of Maurin et al. (2018) remain unchanged.

2. Conclusions

It is observed in Valencia et al. (2019) that an erroneous contour definition is used to generate the figure 4 of Maurin et al. (2018). This erratum confirms the erroneous data, and specify that it has no consequence on the rest of the work.

References

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