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Symmetry of Phonon Modes for Periodic Structures with Glide Symmetry

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This poster reports our recent work on the group-theoretical analysis to the Bloch modes of phononic crystals with glide symmetry. Periodic structures with glide symmetry are commonly found in recent literature on phononic crystals and mechanical/acoustic metamaterials. The glide symmetry has given rise to some interesting phenomena in the band structure such as sticking-bands and frequency degeneracies that dictate the structures' functionality. However, there is a lack of systematic analysis to these structures due to the challenge of dealing with nonsymmorphic space groups. Therefore, this work addresses this issue by introducing a group-theoretical procedure enabling the symmetry analysis to phonon modes when the glide symmetry exists. By taking the *p*4*g* group as an example, the symmetry of phonon modes is discussed by deriving the small representations for high symmetry **k**-points, and different types of degeneracies are elucidated for both interior and boundary regions of the Brillouin zone. The method presented in this work not only offers thorough understanding to the behavior of phononic crystals from a group theory perspective but also facilitates the symmetry-guided design of nonsymmorphic phononic crystals and metamaterials.