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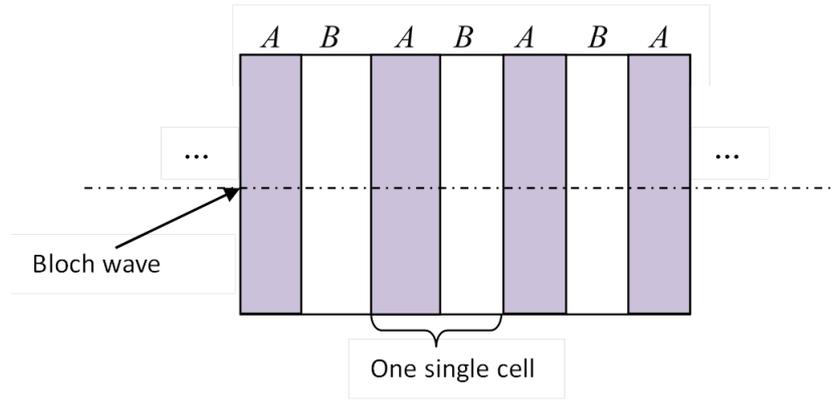


Fig.1 The periodic laminated structure consisting of dipolar gradient thermoelastic solids

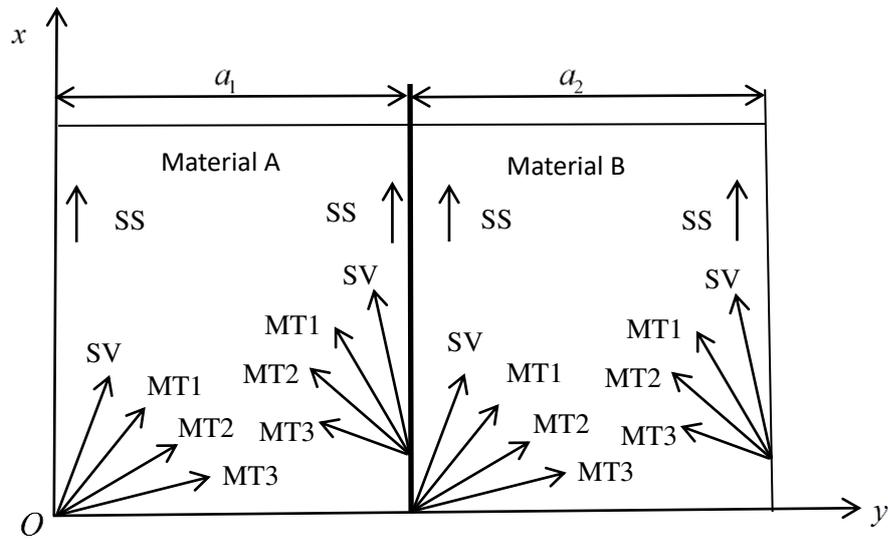


Fig.2 The thermoelastic coupled waves in a typical single cell in oblique propagation

situation

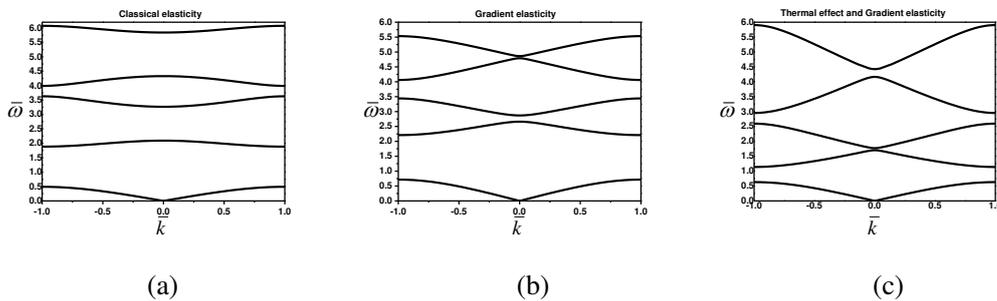


Fig. 3 Comparison of the dispersion curves and band gaps of phononic structure based on three models in the case of the vertical propagation.

(a) Classical elasticity ($\bar{c}_1 = \bar{c}_2 = \bar{d}_1 = \bar{d}_2 = \bar{\tau}_1 = \bar{\tau}_2 = \alpha_1 = \alpha_2 = 0$);

(b) Gradient elasticity ($\bar{c}_1 = 0.15, c_R = 1.5, \bar{d}_1 = 0.25, d_R = 1.5, \bar{\tau}_1 = \bar{\tau}_2 = \alpha_1 = \alpha_2 = 0$);

(c) Thermal and gradient elasticity ($\bar{c}_1 = 0.15, c_R = 1.5, \bar{d}_1 = 0.25, d_R = 1.5, \tau_R = 1, \alpha_R = 1$).

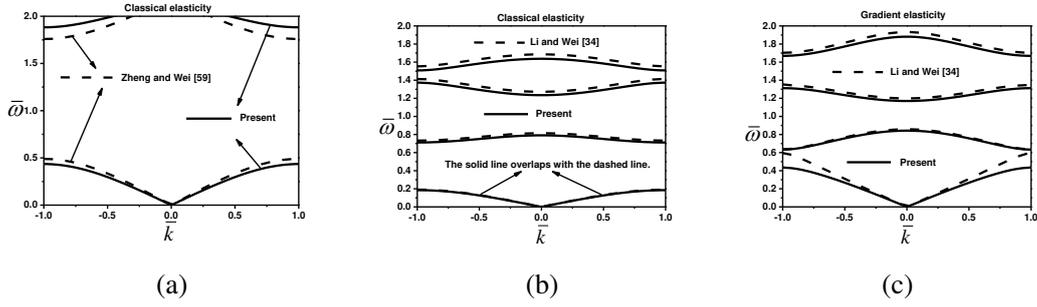


Fig.4 Comparison of dispersion and bandgap with existing literatures.

(a) and (b) the dispersion curves for the classic elastic solids and the comparison with literature [59] and [34]; (c) the dispersion curves for the gradient elastic solids and the comparison with literature [34].

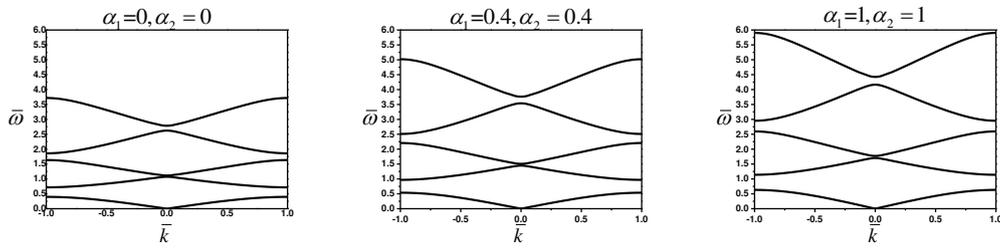


Fig.5. The influence of fractional parameter α on the dispersion curves and the band gaps of Bloch waves (vertical propagation) in the case of gradient thermo-elastic model.

($\bar{c}_1 = 0.15, c_R = 1.5, \bar{d}_1 = 0.25, d_R = 1.5, \tau_R = 1$).

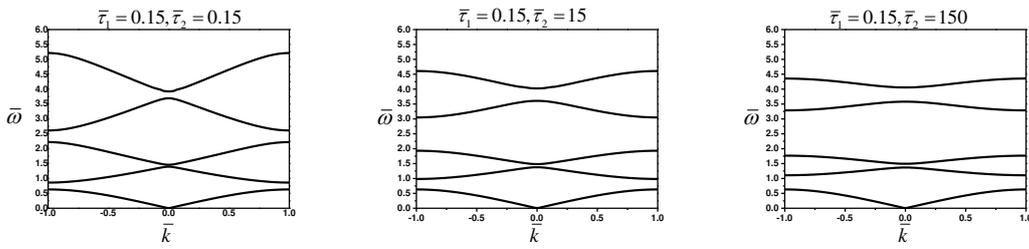


Fig.6. The influence of thermal relaxation time $\bar{\tau}$ on the dispersion curves and the band gaps of Bloch waves (vertical propagation) in the case of gradient thermo-elastic model.

($\bar{c}_1 = 0.15, c_R = 1.5, \bar{d}_1 = 0.25, d_R = 1.5, \alpha_R = 1$).

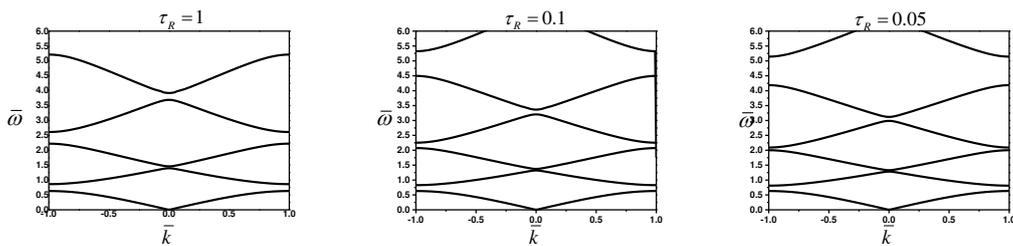


Fig.7 The influence of thermal relaxation time ratio τ_R on the dispersion curves and the band gaps of Bloch waves (vertical propagation) in the case of gradient thermo-elastic model.

$$(\bar{c}_1 = 0.15, c_R = 1.5, \bar{d}_1 = 0.25, d_R = 1.5, \alpha_R = 1, \bar{\tau}_2 = 0.15).$$

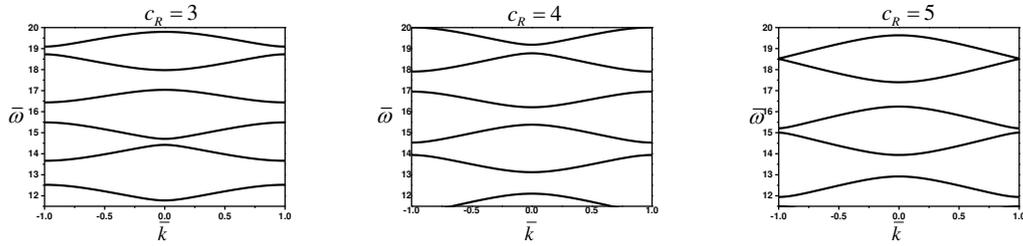


Fig. 8. The influence of micro-stiffness length scale parameter ratio c_R on the dispersion curves and the band gaps of Bloch waves (vertical propagation) in the case of gradient thermo-elastic

$$\text{model.. } (\bar{c}_1 = 0.15, \bar{d}_1 = 0.25, d_R = 1.5, \alpha_1 = 0, \alpha_2 = 0, \tau_R = 1).$$

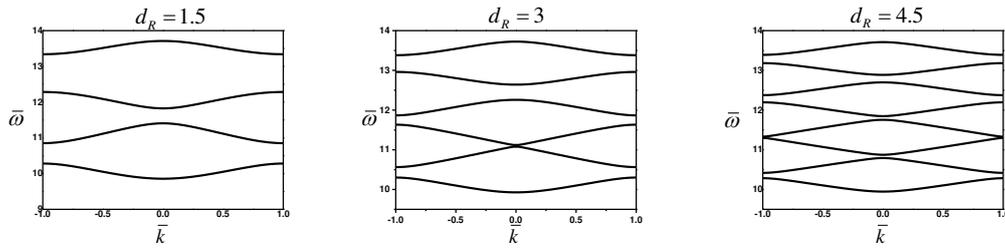


Fig.9. The influence of the micro-inertial length scale parameter ratio d_R on the dispersion curves and the band gaps of Bloch waves (vertical propagation) in the case of gradient thermo-elastic model. $(\bar{c}_1 = 0.15, c_R = 1.5, \bar{d}_1 = 0.25, \alpha_1 = 0, \alpha_2 = 0, \tau_R = 1)$.

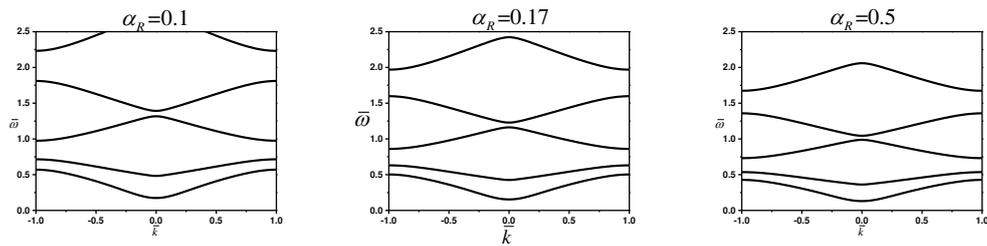


Fig.10. The influence of fractional parameter ratio α_R on the dispersion curves and the band gaps of Bloch waves (oblique propagation) in the case of gradient thermo-elastic model.

$$(\bar{c}_1 = 0.15, c_R = 1.5, \bar{d}_1 = 0.25, d_R = 1.5, \tau_R = 1, \alpha_2 = 0.1, \bar{\xi} = 2).$$

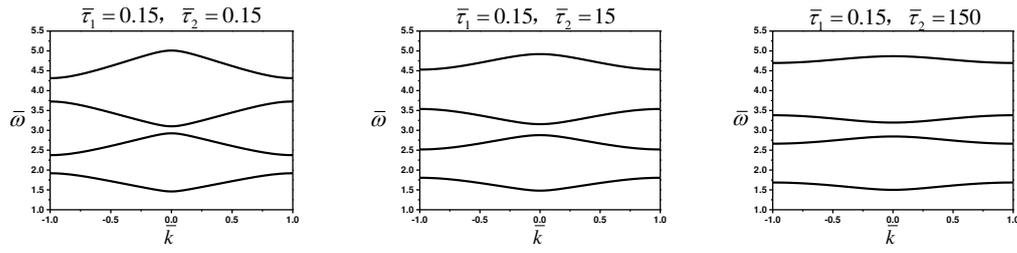


Fig.11. The influence of thermal relaxation time $\bar{\tau}$ on the dispersion curves and the band gaps of Bloch waves (oblique propagation) in the case of gradient thermo-elastic model.

$$(\bar{c}_1 = 0.15, c_R = 1.5, \bar{d}_1 = 0.25, d_R = 1.5, \alpha_R = 1, \bar{\xi} = 3).$$