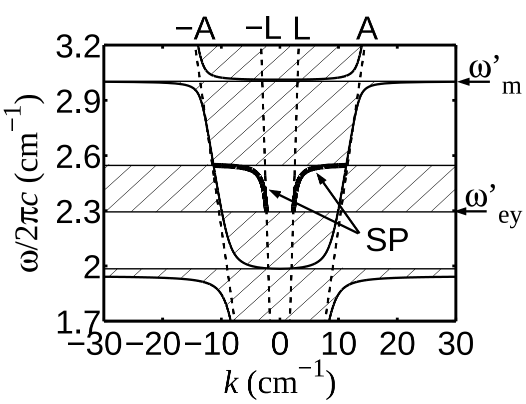
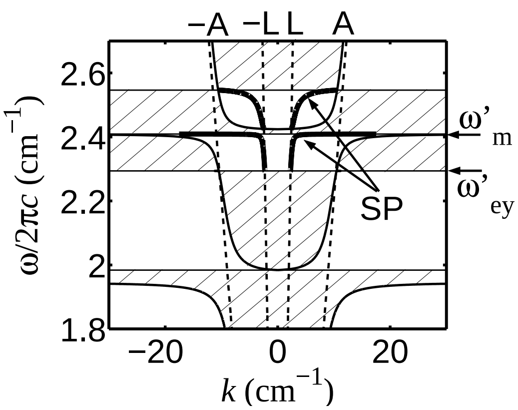


(a)Dispersion relation with close frequency of magnetic and electric



(b)The magnetic resonance inside the window

FIG. 5. Dispersion relation for a material with electric and magnetic resonances near one another in frequency. In (a) the dispersion relation without external magnetic field is shown. In (b), the magnetic resonance frequency is shifted into a surface mode window with the application of a large magnetic field, $H_o = 12$T.

and bulk polariton bands is shown in Fig.5(a). The dielectric constant background has also been reduced to $\epsilon_y^\infty = 2.6$, in order to widen the surface mode window. Application of an external magnetic field lowers the magnetic resonance frequency. Application of a large external magnetic of 12 T places the magnetic resonance inside the window as illustrated in Fig.5(b).

Inside the window, the magnetic resonance splits the surface mode into low and high frequency branches for each direction of propagation. The properties of the upper part are similar to that discussed in the previous section. However, the lower branch terminates at the magnetic resonance frequency as illustrated in Fig.5(b). In this case, the requirement that the dielectric constant ϵ_y should be negative for surface modes prevents both the upper and lower branches to exist in the region where $k >> \frac{\omega}{c}$.

In a second example, we consider if the exchange constant is -4000 and the anisotropy constant is 4. The ME coupling is also changed to 40 m^2/C, which keeps the canting angle small. The dispersion relation at temperature 150 K is presented in Fig.6(a). As temperature is increased to 250 K, the polarisation will decrease while the magnetisation does not change significantly. Hence, the electric resonance goes below the magnetic resonance frequency.