In[1191]:=
```
Clear["Global`*"]

KK2x2 = {{k1[-1], 0}, {0, k1[0]}};
BB2x2 = {{0, k3[-1]}, {k2[0], 0}};
M2x2 = Inverse[KK2x2].BB2x2;
```

In[1195]:=
$$k1[n\_] := \frac{1}{4\,k^3\,q[n]}\,i\,\Big(4\,k\,\mu\,\text{Cosh}[H\,q[n]]\,q[n]^3 + k\,q[n]\,\Big(8\,k^2\,\mu\,\text{Cosh}[H\,k] - \rho\,\omega^2\,\text{Cosh}[H\,k] - 4\,n\,\rho\,\omega^2\,\text{Cosh}[H\,k] - 4\,n^2\,\rho\,\omega^2\,\text{Cosh}[H\,k] - 12\,k^2\,\mu\,\text{Cosh}[H\,q[n]] + \rho\,\omega^2\,\text{Cosh}[H\,q[n]] + 4\,n\,\rho\,\omega^2\,\text{Cosh}[H\,q[n]] + 4\,n^2\,\rho\,\omega^2\,\text{Cosh}[H\,q[n]] + 4\,k^3\,\gamma\,\text{Sinh}[H\,k] - 4\,g\,k\,\rho\,\text{Sinh}[H\,k] + G[n]\,\Big(4\,k\,\big(k^2\,\gamma - g\,\rho\big)\,\text{Cosh}[H\,k] + \big(-4\,k^3\,\gamma + 4\,g\,k\,\rho\big)\,\text{Cosh}[H\,q[n]] + \big(8\,k^2\,\mu - \rho\,(\omega + 2\,n\,\omega)^2\big)\,\text{Sinh}[H\,k]\Big) + 4\,k^3\,\big(-k^2\,\gamma + g\,\rho\big)\,\text{Sinh}[H\,q[n]] - \big(12\,k^2\,\mu - \rho\,(\omega + 2\,n\,\omega)^2\big)\,G[n]\,q[n]^2\,\text{Sinh}[H\,q[n]] + 4\,\mu\,G[n]\,q[n]^4\,\text{Sinh}[H\,q[n]]\Big)$$

$$k1c[n\_] := -\frac{1}{4\,k^3\,qc[n]}\,i\,\Big(4\,k\,\mu\,\text{Cosh}[H\,qc[n]]\,qc[n]^3 + k\,qc[n]\,\Big(8\,k^2\,\mu\,\text{Cosh}[H\,k] - \rho\,\omega^2\,\text{Cosh}[H\,k] - 4\,n\,\rho\,\omega^2\,\text{Cosh}[H\,k] - 4\,n^2\,\rho\,\omega^2\,\text{Cosh}[H\,k] - 12\,k^2\,\mu\,\text{Cosh}[H\,qc[n]] + \rho\,\omega^2\,\text{Cosh}[H\,qc[n]] + 4\,n\,\rho\,\omega^2\,\text{Cosh}[H\,qc[n]] + 4\,n^2\,\rho\,\omega^2\,\text{Cosh}[H\,qc[n]] + 4\,k^3\,\gamma\,\text{Sinh}[H\,k] - 4\,g\,k\,\rho\,\text{Sinh}[H\,k] + Gc[n]\,\Big(4\,k\,\big(k^2\,\gamma - g\,\rho\big)\,\text{Cosh}[H\,k] + \big(-4\,k^3\,\gamma + 4\,g\,k\,\rho\big)\,\text{Cosh}[H\,qc[n]] + \big(8\,k^2\,\mu - \rho\,(\omega + 2\,n\,\omega)^2\big)\,\text{Sinh}[H\,k]\Big) + 4\,k^3\,\big(-k^2\,\gamma + g\,\rho\big)\,\text{Sinh}[H\,qc[n]] - \big(12\,k^2\,\mu - \rho\,(\omega + 2\,n\,\omega)^2\big)\,Gc[n]\,qc[n]^2\,\text{Sinh}[H\,qc[n]] + 4\,\mu\,Gc[n]\,qc[n]^4\,\text{Sinh}[H\,qc[n]]\Big)$$

$$k3[n\_] := -\frac{1}{k}\,i\,\rho\,\Big(\big(-\text{Cosh}[H\,k] + \text{Cosh}[H\,q[1+n]]\big)\,G[1+n] - \text{Sinh}[H\,k] + \frac{k\,\text{Sinh}[H\,q[1+n]]}{q[1+n]}\Big)$$

$$k3c[n\_] := \frac{1}{k}\,i\,\rho\,\Big(\big(-\text{Cosh}[H\,k] + \text{Cosh}[H\,qc[1+n]]\big)\,Gc[1+n] - \text{Sinh}[H\,k] + \frac{k\,\text{Sinh}[H\,qc[1+n]]}{qc[1+n]}\Big)$$

$$k2[n\_] := -\frac{1}{k}\,i\,\rho\,\Big(\big(-\text{Cosh}[H\,k] + \text{Cosh}[H\,q[-1+n]]\big)\,G[-1+n] - \text{Sinh}[H\,k] + \frac{k\,\text{Sinh}[H\,q[-1+n]]}{q[-1+n]}\Big)$$

$$k2c[n\_] := \frac{1}{k}\,i\,\rho\,\Big(\big(-\text{Cosh}[H\,k] + \text{Cosh}[H\,qc[-1+n]]\big)\,Gc[-1+n] - \text{Sinh}[H\,k] + \frac{k\,\text{Sinh}[H\,qc[-1+n]]}{qc[-1+n]}\Big)$$

In[1201]:=
$$G[n\_] := -\frac{k\,\big(-2\,k\,q[n]\,\text{Sinh}[H\,k] + k^2\,\text{Sinh}[H\,q[n]] + q[n]^2\,\text{Sinh}[H\,q[n]]\big)}{k^2\,\big(-2\,\text{Cosh}[H\,k] + \text{Cosh}[H\,q[n]]\big)\,q[n] + \text{Cosh}[H\,q[n]]\,q[n]^3}$$

$$Gc[n\_] := -\frac{k\,\big(-2\,k\,qc[n]\,\text{Sinh}[H\,k] + k^2\,\text{Sinh}[H\,qc[n]] + qc[n]^2\,\text{Sinh}[H\,qc[n]]\big)}{k^2\,\big(-2\,\text{Cosh}[H\,k] + \text{Cosh}[H\,qc[n]]\big)\,qc[n] + \text{Cosh}[H\,qc[n]]\,qc[n]^3}$$

In[1203]:=
```
q[0] = 1 / (2 H) * Sqrt[4 k^2 H^2 - αω^2];
qc[0] = 1 / (2 H) * Sqrt[4 k^2 H^2 - αω^2];
q[-1] = 1 / (2 H) * Sqrt[4 k^2 H^2 - αω^2];
qc[-1] = 1 / (2 H) * Sqrt[4 k^2 H^2 - αω^2];
q[1] = 1 / (2 H) * Sqrt[4 k^2 H^2 - 9 αω^2];
qc[1] = 1 / (2 H) * Sqrt[4 k^2 H^2 - 9 αω^2];
q[-2] = 1 / (2 H) * Sqrt[4 k^2 H^2 - 9 αω^2];
qc[-2] = 1 / (2 H) * Sqrt[4 k^2 H^2 - 9 αω^2];

λx = 1;
ω = Sqrt[μ / ρ] (αω / H);
γ = μ H αγ;
μ = (ρ g H) / αg;
```

In[1215]:=
```
KKadim = Simplify[Simplify[KK2x2] /. k → kk / H];
BBadim = Simplify[Simplify[BB2x2] /. k → kk / H];
```

In[1217]:=
```
Madim = Simplify[g * Inverse[KKadim].BBadim];

upval = 350;
div = 100;
αgval = 0.1;
αγval = 0;
β = 0;
αωval = {5 / 10, 1, 2, 25 / 10, 3, 31 / 10, 313 / 100};
For[nn = 0, nn < Length[αωval], nn++;
 β += 1;
 Print["αω= ", N[nn]];
 For[i = 0, i < upval, i += 1;
  bb = (1 * i / div);
  state = False;
  For[r = 1, r < 3, r++,
   For[t = 1, t < 3, t++,
    If[(Chop[(Madim /. {αω → αωval[[nn]], kk → bb, αg → αgval, αγ → αγval})])[[
        r, t]] === Indeterminate, state = True]
   ]
  ];
  If[state, eigen2 = 10^(16), eigen2 =
    N[Eigenvalues[(Madim /. {αω → αωval[[nn]], kk → bb, αg → αgval, αγ → αγval}),
      Method → "Direct"]]];
  inveigen2[i] = 1 / Max[Re[eigen2]];
 ];
 listaa[nn] = Table[{(1 * i / div), inveigen2[i]}, {i, 1, upval}];
]
grafico2 = Table[listaa[nn], {nn, 1, Length[αωval]}];
```

In[•]:=
```
vett = {};
graph = grafico2[[5]];
For[ll = 0, ll < Length[graph], ll += 1;
  AppendTo[vett, graph[[ll]][[2]]]
 ];
ord = Sort[vett];
ac = ord[[1]];
N[ac]
poskk = (Position[graph, ac] - {{0, 1}}) // Flatten;
kck = N[Extract[graph, poskk]]
```