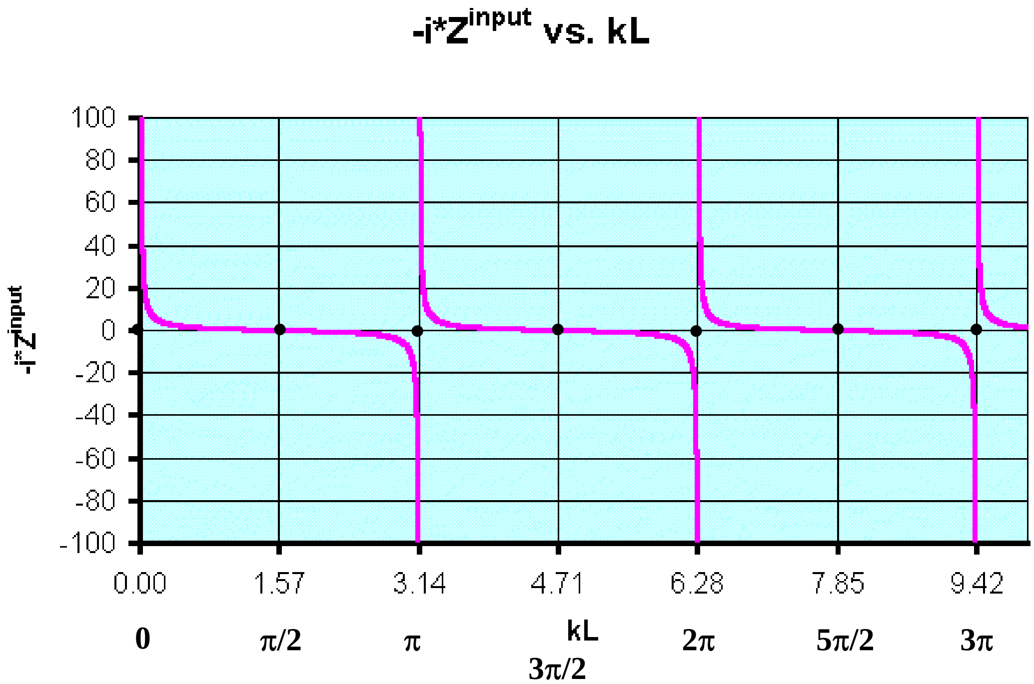

It can be seen that from this curve that $|Z^{input}| \sim 0$ for much of the range of kL values, except near $kL \sim m\pi$, m = 0, 1, 2, 3, 4, ... and that $|Z^{input}| = 0$ for $kL = (2n-1)\pi/2$, n = 1, 2, 3, 4, ...

A More Realistic Motion of the End Supports

If one of the end supports on a guitar - either the bridge or the nut at the end of the neck of a guitar is not completely rigid, or a slide/bottleneck of finite mass, M is used on the strings of the guitar, then this quasi-fixed/quasi-free end support will have associated with it a *finite*, complex impedance, $Z = Z_r + iZ_i$,, with $|Z| = (Z^*Z)^{½} = [(Z_r - iZ_i)(Z_r + iZ_i)]^{½} = (Z_r^2 + Z_i^2)^{½}$. If the so-called *imaginary* part, Z_i (i.e. the out-of-phase component) of the complex impedance, Z is *positive*, the motion of this not-completely-rigid end support relative to the string at this point is "mass-like", and the fixed end-fixed end resonances - transverse vibrational modes of the string, $f_n = v_x/\lambda_n = nv_x/2L$, n = 1, 2, 3, 4, ... will be slightly *raised*. If the so-called imaginary part, Z_i of the complex impedance, Z is *negative*, the motion of the not-completely-rigid end support is "spring-like", and the fixed end-fixed end resonances/vibrational modes of the string, $f_n = v_x/\lambda_n = nv_x/2L$, n = 1, 2, 3, 4, ... will be slightly *lowered* as a result. The so-called real part, Z_r (i.e. the in-phase component) of the complex impedance, Z is proportional to the rate of energy transfer from the string to the not-completely-rigid end support.