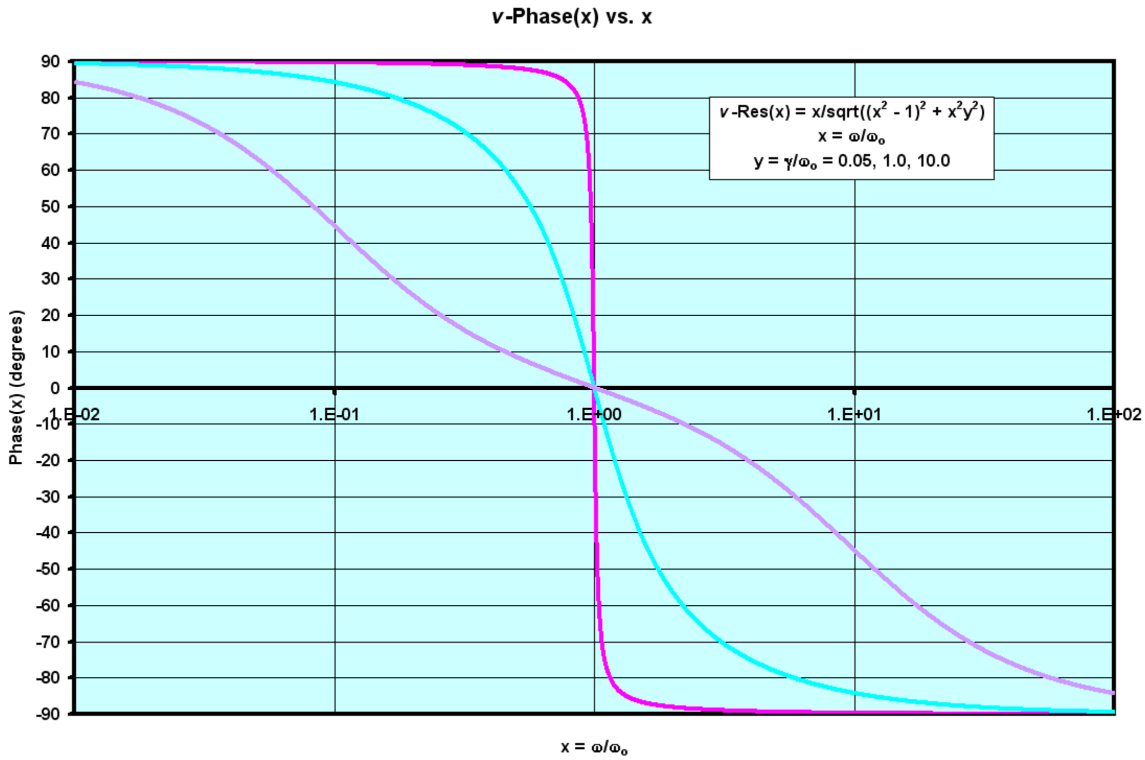

We see from the above two figures that for dynamic and/or ribbon microphones, whose output signal response $\tilde{\varepsilon}(t)$ to an over-pressure $\tilde{p}(t)$ is linearly proportional to the ***velocity*** of the diaphragm, $\tilde{v}_{dia}(t)$ if the diaphragm of these types of microphone (*a*.) has a ***sub*-*sonic*** resonance (*i.e.* $f_o \equiv \omega_o/2\pi < 20\ Hz$ and (*b*.) is ***critically*-*damped*** ($y \equiv \gamma_{dia}/\omega_o = 1.0$, cyan curve), then we are able to achieve a region of flat frequency response, albeit again with ***non*-*constant*** phase shift over the {fractional} frequency range $0.01 \le x(\omega) \equiv \omega/\omega_o \le 100$.

The above discussion(s) of damped simple harmonic oscillator-type descriptions of the frequency-dependent behavior of various types of microphone diaphragms are in fact quite simplistic – ***real*** microphones are considerably more complex than that given in the above discussion(s). Equivalent electronic circuit models are often used to analytically (and/or numerically) compute the frequency and phase response of such microphones. The figure below shows the equivalent electronic circuit used for modeling the behavior of a ribbon-type microphone: