The cooperative functioning of the eardrum and ossicular chain attenuation in this figure can be regarded as the amplifier R_s . The perilymph fluid column equals the mass m.
The combined elastic behavior of the eardrum, oval window and round window are represented by the spring constant k, while the damping is indicated as ξ .
The perilymph velocity as a function of frequency can be calculated by means of a standard solution in physics: the second order differential equation. Depending on practical data for m, ξ and k in the cochlea, the results of this calculation will show a resonance frequency f_r of 1000 – 2000 Hz and a 3 dB per octave increase in perilymph velocity v for frequencies lower than f_r , and a 3 dB per octave decrease for frequencies higher than f_r.