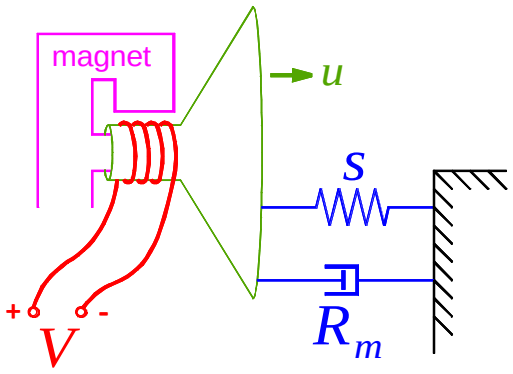
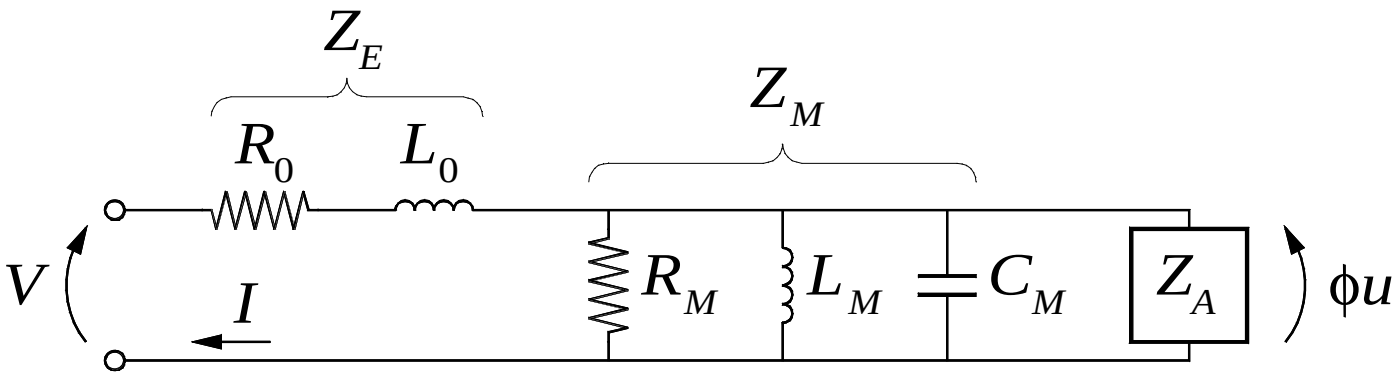
MOVING COIL SPEAKER

Model for the moving coil loudspeaker.



Faraday's law: $V = \phi u$

Lorentz force: $F = \phi I$



u = velocity of the voice coil [m/s]
I = electrical current [A]
R_0 = electrical resistance of the voice coil [Ω]
L_0 = electrical inductance of the voice coil [H]
s = spring stiffness due to flexible cone suspension material [N/m]
R_m = mechanical resistance, a small frictional force [(N· s)/m or kg/s]
R_M = effective electrical resistance due to the mechanical resistance of the system [Ω]
C_M = effective electrical capacitance due to the mechanical stiffness [F]
L_M = effective electrical inductance due to the mechanical inertia [H]
V = voltage applied to the voice coil [V]
Z_E = electrical impedance due to electrical components [Ω]
Z_A = effective electrical impedance due to mechanical air loading [Ω]
Z_M = effective electrical impedance due to the mechanical effects of spring stiffness, mass, and (mechanical) resistance [Ω]
F = force on the voice coil [V]
$\phi = Bl$ coupling coefficient [N/A]
B = magnetic field [Tesla (an SI unit)]
l = length of wire in the voice coil [m]