amplitude, $|y_o| \sim 1.0$ mm = 0.001 m = 1×10^{-3} m, then e.g. for the fundamental mode of vibration of the high-E string, with $f_{hi\text{-}E} = 330$ Hz, then $y(x, t)|_{hi\text{-}E} = y_o \sin(k_{hi\text{-}E}\, x)\sin(\omega_{hi\text{-}E}\, t)$. The transverse velocity of the vibrating string, $u_y(x,t)|_{hi\text{-}E} = \partial/\partial t[y(x,t)|_{hi\text{-}E}] = \omega_{hi\text{-}E}\, y_o \sin(k_{hi\text{-}E}\, x)\cos(\omega_{hi\text{-}E}\, t)$. The neck pickup of an electric guitar is typically located at the *anti-node* of the 2nd harmonic, thus $x_{pu} = {}^5/_8 L_{scale}$, and since $\lambda_{hi\text{-}E} = 2L_{scale}$, $k_{hi\text{-}E} = 2\pi/\lambda_{hi\text{-}E} = \pi/L_{scale}$ and $\omega_{hi\text{-}E} = 2\pi f_{hi\text{-}E}$. The typical strength of the magnetic field intensity, B of a permanent magnet *at the pole of the magnet* is B(z=0) ~ 1.0 kilo-Gauss = 0.1 Tesla. The string of the guitar is typically located a few mm above the pole of the permanent magnet; the magnetic field strength |B(z = 4-5 mm)| at this point is typically ~ 20% of that at the pole of the permanent magnet, i.e. |B(z = 4-5 mm)| ~ 0.2|B(z=0)| ~ 200 Gauss = 0.2 kilo-Gauss = 0.02 Tesla.

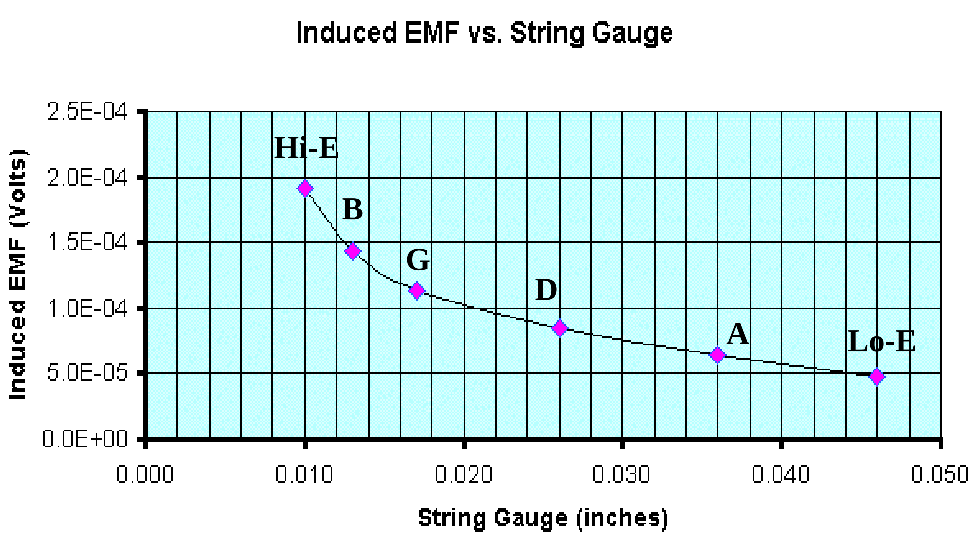
Putting this all together, the typical *amplitude* of the time-dependent EMF, |ε| induced across the ends of the vibrating string of an electric guitar, for an electric guitar pickup located at $x = {}^5/_8 L_{scale}$ from the nut of the guitar, with the string vibrating in the plane of the strings of the guitar (parallel to the body of the guitar, and perpendicular to the magnetic field of the poles of the guitar pickup) is given by:

$$|\varepsilon|_{hi-E} \cong u_y(x = \tfrac{5}{8}L_{scale})\Big|_{hi-E} B(x = \tfrac{5}{8}L_{scale})D$$

$$= 2\pi f_{hi-E}\,|y_o|\sin(\tfrac{5}{8}\pi)B(x = \tfrac{5}{8}L_{scale})D$$

$$= 2\pi * 330Hz * 0.001m * \sin(\tfrac{5}{8}\pi) * 0.02Tesla * 0.005m \sim 0.2mV$$

The EMF, |ε| induced across the ends of each string of an electric guitar is shown below.



If the strings vibrate *perpendicular* to the plane of the guitar body - parallel to the magnetic field of the poles of the magnetic pickups of the guitar, *no* EMF is induced across the ends of the vibrating strings of a guitar - because sinφ = 0 in this situation.