Velocity of propagation is a measure of how fast a wave travels over a time.

Let us assume an inductor L having length 'l'.

for a small section dx,

Total inductance $= L \cdot dx$

Flux (ϕ) $= i \cdot L \cdot dx$

Induce voltage $= \frac{d\phi}{dt}$

$= i \cdot L \cdot \frac{dx}{dt}$

$\therefore e = i \cdot L \cdot v$ — (1)

Total capacitance $= C \cdot dx$

for a small section charge delivered

$dq = e \cdot C \cdot dx$

$\Rightarrow i = \frac{dq}{dt} = e \cdot C \cdot v$ — (2)

Multiplying equ. (1) & (2)

$ei = ei LC v^2$

$\Rightarrow v^2 = \frac{1}{LC}$

$\Rightarrow \boxed{v = \pm \frac{1}{\sqrt{LC}}}$

v = velocity of wave.