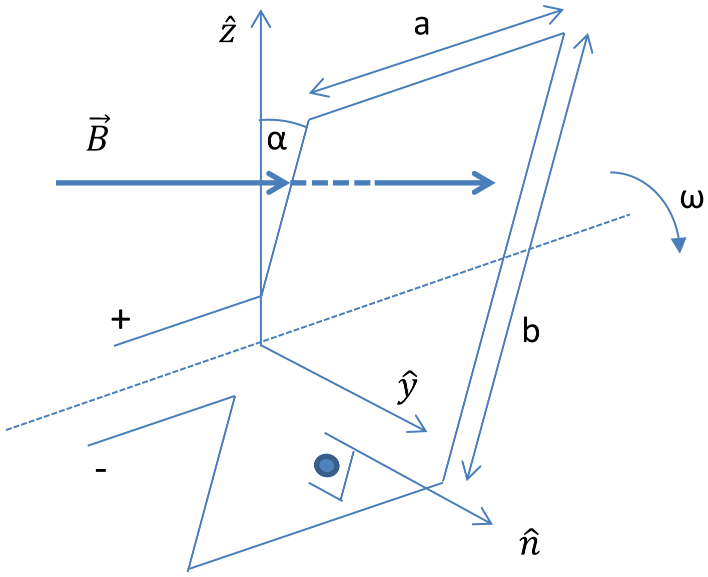
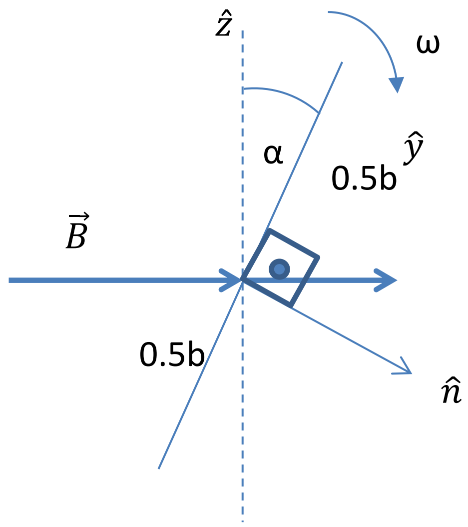
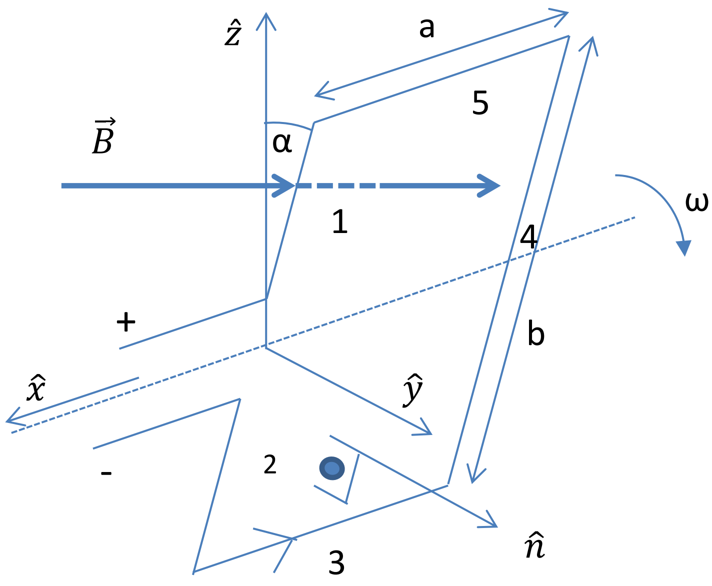
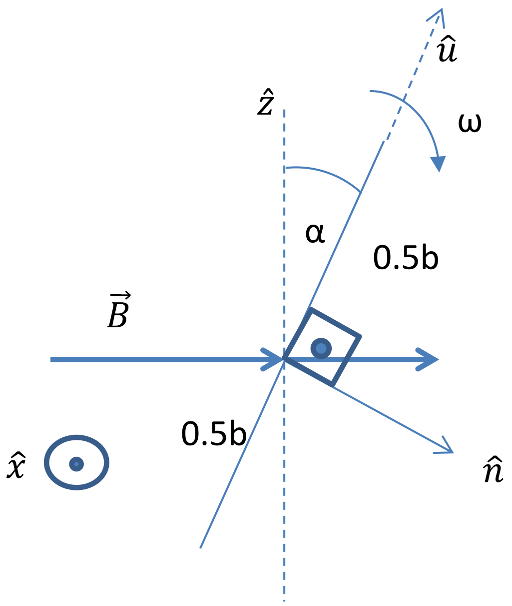




Total EMF	$\Phi = -\frac{d}{dt}\left(\int \vec{B}\cdot\overrightarrow{dS}\right)$	
	Assume $\vec{B}$=$B_0\cos(\omega t)\,\hat{y}$	
	$\vec{B}\cdot\overrightarrow{dS} = \cos(\alpha).\,B_0\cos(\omega t).\,dS$	
	$\Phi = -\frac{d}{dt}\left(\int \cos(\alpha).\,B_0\cos(\omega t).\,dS\right)$	
	$\Phi = -\frac{d}{dt}\left(\cos(\alpha).\,B_0\cos(\omega t)\int dS\right)$	
	S=ab	
	$\alpha = \omega t$	
	$\frac{d\alpha}{dt} = \omega$	
	$\Phi = -\frac{d}{dt}(\cos(\alpha)\,.\,B_0\cos(\omega t)\,S)$	
	$\Phi = -\left(-\sin(\alpha)\frac{d\alpha}{dt}B_0\cos(\omega t)\,S + \cos(\alpha)\,.\,B_0(-\sin(\omega t)\omega)S\right)$	
	$\Phi = \sin(\alpha)\omega\,B_0\cos(\omega t)\,S + \cos(\alpha)\,.\,B_0\sin(\omega t)\omega\,S$	
	$\Phi = 2\omega BS_0\sin(\omega t)\cos(\omega t)$	
	$\Phi = \omega BS_0\sin(2\omega t)$ (volts)	

Total EMF	$\Phi = -\frac{d}{dt}\left(\int \vec{B}\cdot\overrightarrow{dS}\right) = -\left(\int \frac{d\vec{B}}{dt}\cdot\overrightarrow{dS}\right) + \oint \vec{v}\times\vec{B}\cdot\overrightarrow{dl}$	
Transformer EMF	$\Phi_{Transformer} = -\left(\int \frac{d\vec{B}}{dt}\cdot\overrightarrow{dS}\right)$	
	$\Phi_{Transformer} = -\left(\int \frac{d(B_0\cos(\omega t)\,\hat{y})}{dt}\cdot\overrightarrow{dS}\right)$	
	$\Phi_{Transformer} = -\left(\int -\omega B_0\sin(\omega t)\hat{y}\cdot\overrightarrow{dS}\right)$	
	$\hat{y}\cdot\overrightarrow{dS} = \cos(\alpha)dS$	
	$\Phi_{Transformer} = -\left(\int -\omega B_0\sin(\omega t)\cos(\alpha)dS\right)$	
	$\Phi_{Transformer} = \int \omega B_0\sin(\omega t)\cos(\alpha)dS$	
	$\Phi_{Transformer} = \omega B_0\sin(\omega t)\cos(\alpha)\int dS$	
	S=ab	
	$\Phi_{Transformer} = \omega B_0\sin(\omega t)\cos(\alpha)\,S$	
Total EMF	$\Phi = -\frac{d}{dt}\left(\int \vec{B}\cdot\overrightarrow{dS}\right) = -\left(\int \frac{d\vec{B}}{dt}\cdot\overrightarrow{dS}\right) + \oint \vec{v}\times\vec{B}\cdot\overrightarrow{dl}$	
Motional EMF	$\Phi_{motional} = \oint \vec{v}\times\vec{B}\cdot\overrightarrow{dl}$	





1:	u: 0.5b->0	$\vec{dl} = du\hat{u}$
2:	u: 0 ->- 0.5b	$\vec{dl} = du\hat{u}$
3:	x: 0.5a->-0.5a	$\vec{dl} = dx\hat{x}$
4:	u: - 0.5b -> 0.5b	$\vec{dl} = du\hat{u}$
5:	x: -0.5a->0.5a	$\vec{dl} = dx\hat{x}$
1:	$\vec{v} =$	$\omega(u)(\hat{n})$
2:	$\vec{v} =$	$\omega(-u)(-\hat{n})$
3:	$\vec{v} =$	$\omega(-0.5b)(-\hat{n})$
4:	$\vec{v} =$	$\omega(u)(\hat{n})$
5:	$\vec{v} =$	$\omega(0.5b)(\hat{n})$

1:	$\vec{v} \times \vec{B} =$	$\omega(u)(\hat{n}) \times B_0\cos(\omega t)\,\hat{y}$	
2:	$\vec{v} \times \vec{B} =$	$\omega(-u)(-\hat{n}) \times B_0\cos(\omega t)\,\hat{y}$	
3:	$\vec{v} \times \vec{B} =$	$\omega(0.5b)(-\hat{n} \times B_0\cos(\omega t)\,\hat{y})$	
4:	$\vec{v} \times \vec{B} =$	$\omega(u)(\hat{n}) \times B_0\cos(\omega t)\,\hat{y}$	
5:	$\vec{v} \times \vec{B} =$	$\omega(0.5b)(\hat{n}) \times B_0\cos(\omega t)\,\hat{y}$	
1:	$\vec{v} \times \vec{B} =$	$\omega(u)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}$	
2:	$\vec{v} \times \vec{B} =$	$\omega(u)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}$	
3:	$\vec{v} \times \vec{B} =$	$-\omega(0.5b)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}$	
4:	$\vec{v} \times \vec{B} =$	$\omega(u)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}$	
5:	$\vec{v} \times \vec{B} =$	$\omega(0.5b)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}$	

1:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$\omega(u)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}\cdot\vec{dl}$	
2:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$\omega(u)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}\cdot\vec{dl}$	
3:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$-\omega(0.5b)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}\cdot\vec{dl}$	
4:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$\omega(u)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}\cdot\vec{dl}$	
5:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$\omega(0.5b)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}\cdot\vec{dl}$	
1:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$\omega(u)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}\cdot du\hat{u}$	
2:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$\omega(u)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}\cdot du\hat{u}$	
3:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$-\omega(0.5b)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}\cdot dx\hat{x}$	
4:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$\omega(u)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}\cdot du\hat{u}$	
5:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$\omega(0.5b)B_0\cos(\omega t)\,\sin(\alpha)\hat{x}\cdot dx\hat{x}$	
1:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	0	
2:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	0	
3:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$-\omega(0.5b)B_0\cos(\omega t)\,\sin(\alpha)dx$	
4:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	0	
5:	$(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$\omega(0.5b)B_0\cos(\omega t)\,\sin(\alpha)dx$	
$\oint(\vec{v}\times\vec{B})\cdot\vec{dl} = \int_1(\vec{v}\times\vec{B})\cdot\vec{dl} + \int_2(\vec{v}\times\vec{B})\cdot\vec{dl} + \int_3(\vec{v}\times\vec{B})\cdot\vec{dl} + \int_4(\vec{v}\times\vec{B})\cdot\vec{dl} + \int_5(\vec{v}\times\vec{B})\cdot\vec{dl}$			
1:	$\int_1(\vec{v}\times\vec{B})\cdot\vec{dl} =$	0	
2:	$\int_2(\vec{v}\times\vec{B})\cdot\vec{dl} =$	0	
3:	$\int_3(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$\int_{0.5a}^{-0.5a} -\omega(0.5b)B_0\cos(\omega t)\sin(\alpha)dx$	
4:	$\int_4(\vec{v}\times\vec{B})\cdot\vec{dl} =$	0	
5:	$\int_5(\vec{v}\times\vec{B})\cdot\vec{dl} =$	$\int_{-0.5a}^{0.5a} \omega(0.5b)B_0\cos(\omega t)\sin(\alpha)dx$	

3:	$\int_{3} (\vec{v} \times \vec{B}) \cdot \vec{dl} =$	$\int_{-0.5a}^{0.5a} \omega(0.5b) B_0 \cos(\omega t) \sin(\alpha) dx$	
3:	$\int_{3} (\vec{v} \times \vec{B}) \cdot \vec{dl} =$	$\omega(0.5b) a B_0 \cos(\omega t) \sin(\alpha)$	
5:	$\int_{5} (\vec{v} \times \vec{B}) \cdot \vec{dl} =$	$\omega(0.5b) a B_0 \cos(\omega t) \sin(\alpha)$	
$\oint (\vec{v} \times \vec{B}) \cdot \vec{dl} = \int_{1} (\vec{v} \times \vec{B}) \cdot \vec{dl} + \int_{2} (\vec{v} \times \vec{B}) \cdot \vec{dl} + \int_{3} (\vec{v} \times \vec{B}) \cdot \vec{dl} + \int_{4} (\vec{v} \times \vec{B}) \cdot \vec{dl} + \int_{5} (\vec{v} \times \vec{B}) \cdot \vec{dl}$			
$\oint (\vec{v} \times \vec{B}) \cdot \vec{dl} = 0 + 0 + \omega(0.5b) a B_0 \cos(\omega t) \sin(\alpha) + 0 + \omega(0.5b) a B_0 \cos(\omega t) \sin(\alpha)$			
$\oint (\vec{v} \times \vec{B}) \cdot \vec{dl} = ab\omega B_0 \cos(\omega t) \sin(\alpha)$			
$\oint (\vec{v} \times \vec{B}) \cdot \vec{dl} = ab\omega B_0 \cos(\omega t) \sin(\omega t)$			
$\Phi_{motional} = \oint \vec{v} \times \vec{B} \cdot \vec{dl} = ab\omega B_0 \cos(\omega t) \sin(\omega t)$			
$\Phi_{total} = \omega S B_0 \sin(2\omega t)$			
$\Phi_{total} = \Phi_{transformer} + \Phi_{motional}$			
$\Phi_{total} = ab\omega B_0 \cos(\omega t) \sin(\omega t) + ab\omega B_0 \cos(\omega t) \sin(\omega t)$			
$\Phi_{total} = 2\, ab\omega B_0 \cos(\omega t) \sin(\omega t)$			
$\Phi_{total} = S\omega B_0\, 2\cos(\omega t) \sin(\omega t)$			
$\Phi_{total} = \omega S B_0 \sin(2\omega t)$ (volts)			