Aguas someras 1D

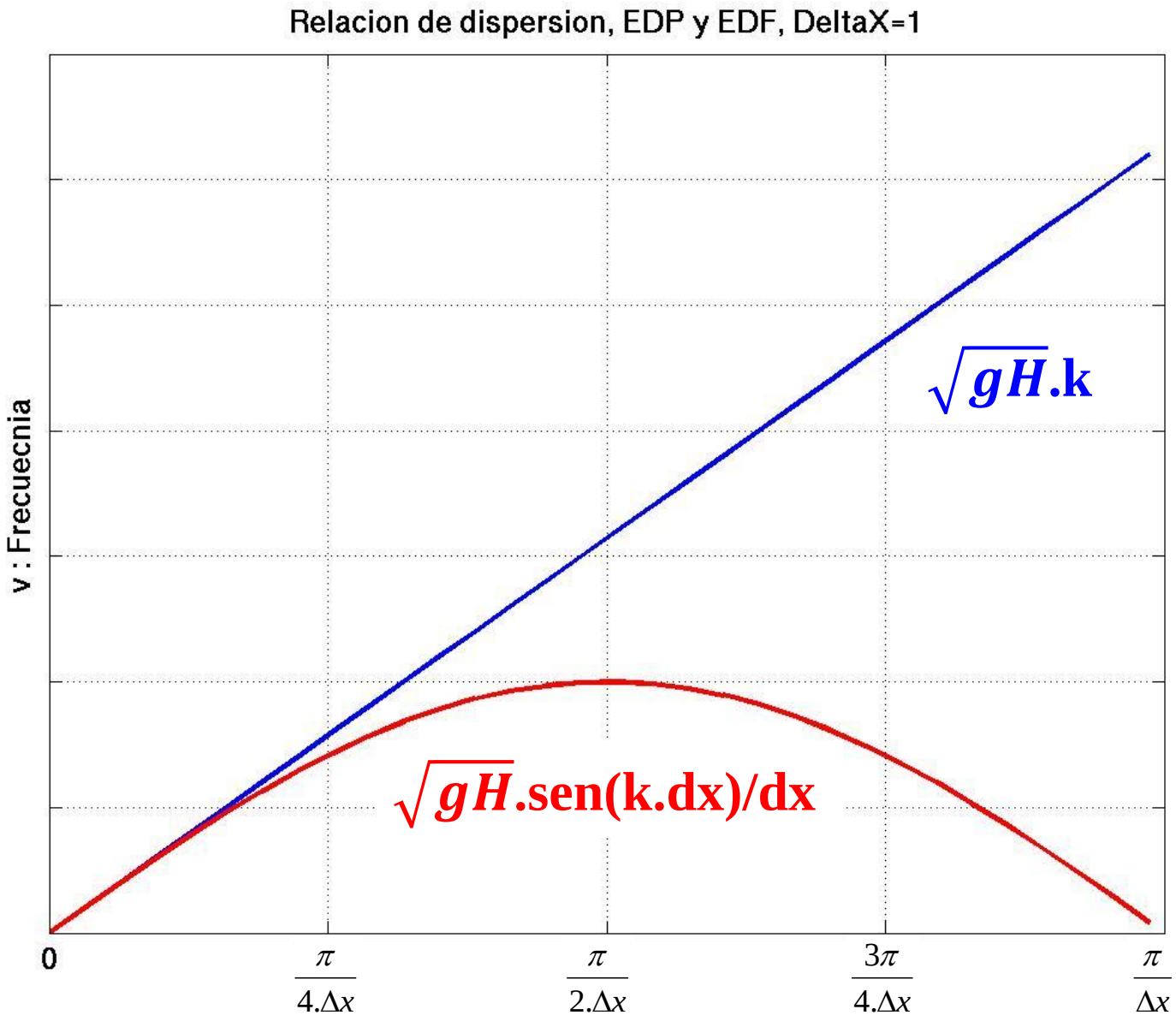
$$\frac{\partial u}{\partial t}+g\,\frac{\partial h}{\partial x}=0$$

$$\frac{\partial h}{\partial t}+H\,\frac{\partial u}{\partial x}=0$$

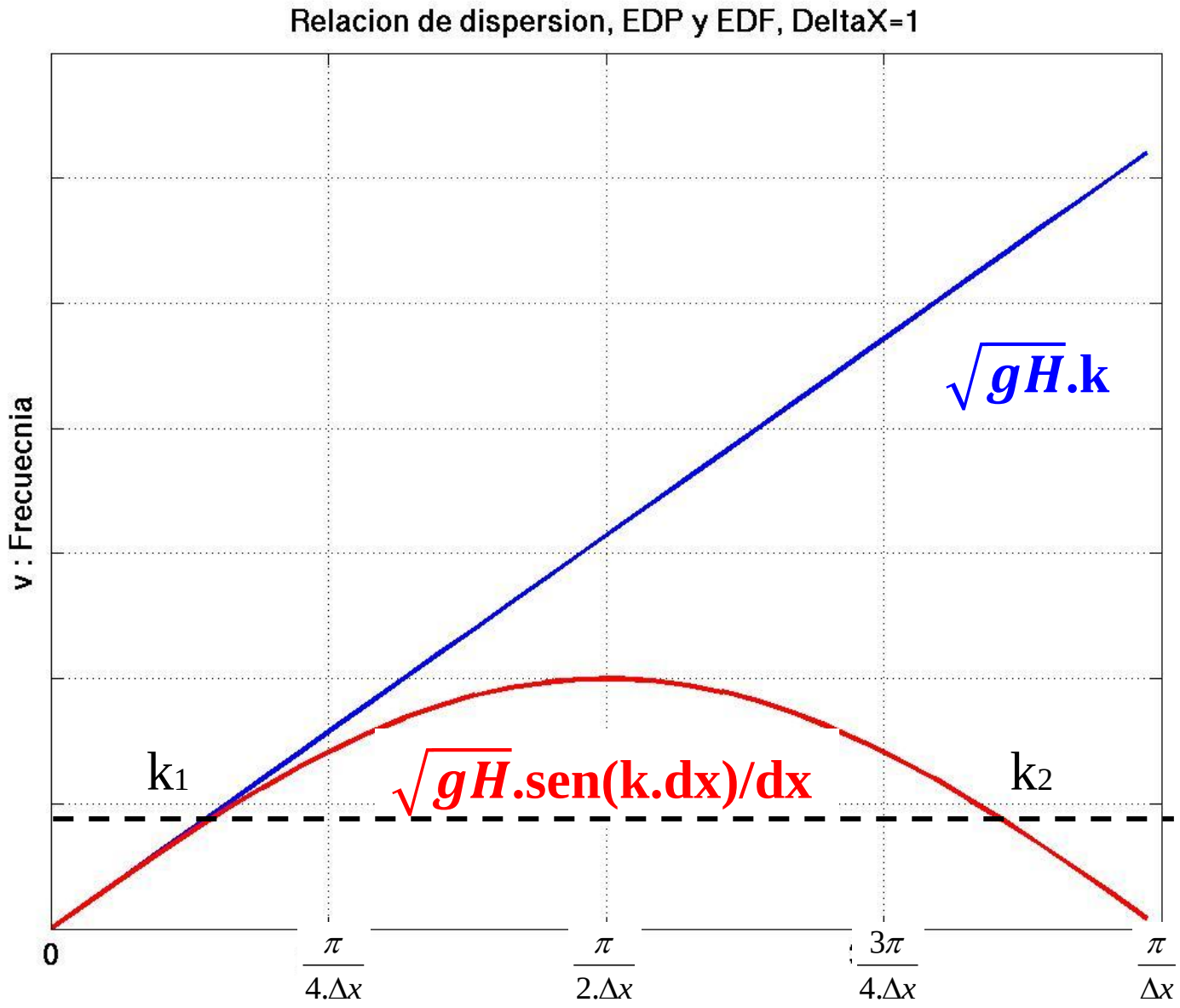
En Sistema continuo: $\upsilon = \pm\sqrt{\boldsymbol{gH}}.k$

Discretizando solo la derivada especial, centrada de segundo orden, con las variables u y h en una misma grilla :

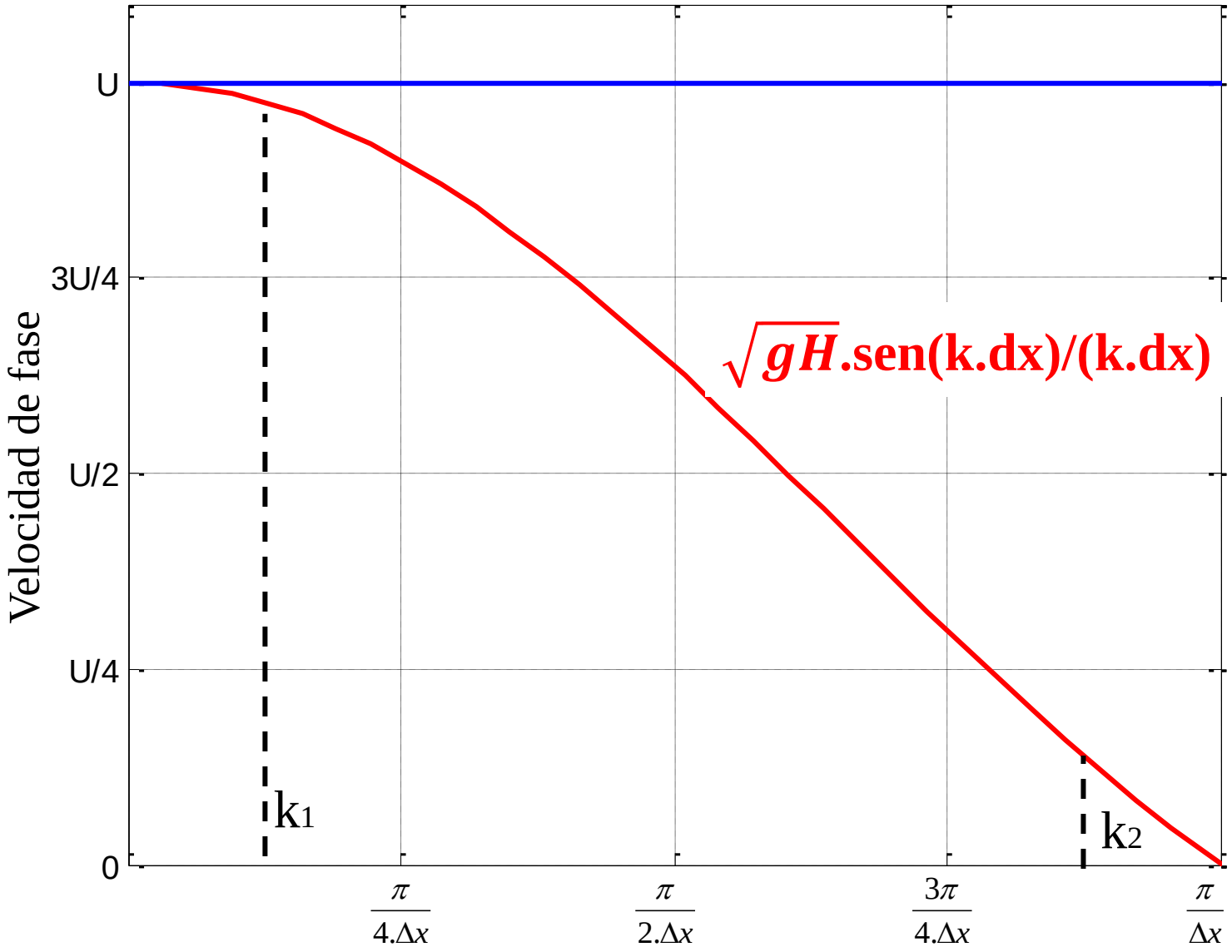
$$\upsilon = \sqrt{\boldsymbol{gH}}.\frac{\boldsymbol{sen}(\boldsymbol{k.dx})}{\boldsymbol{dx}}$$

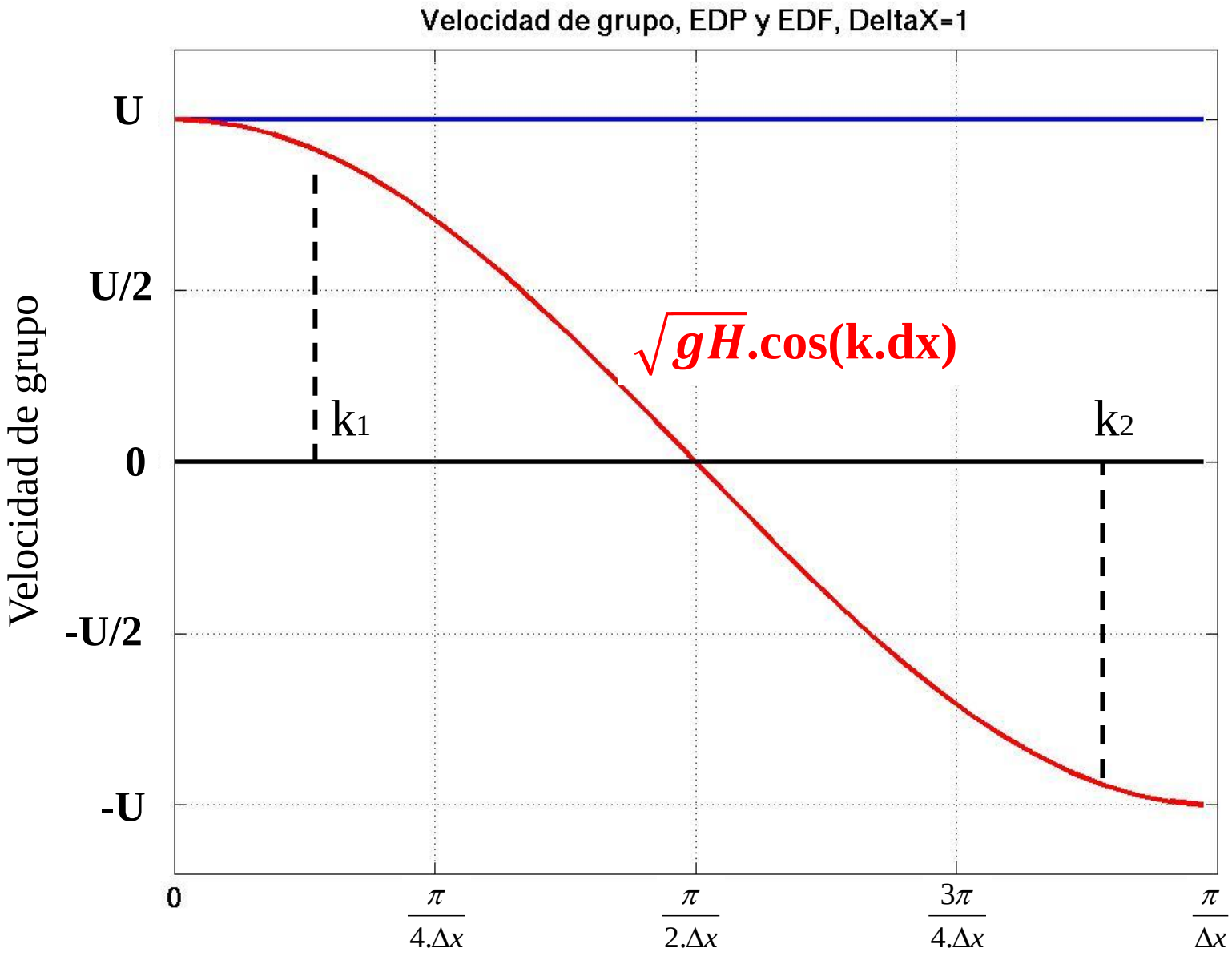


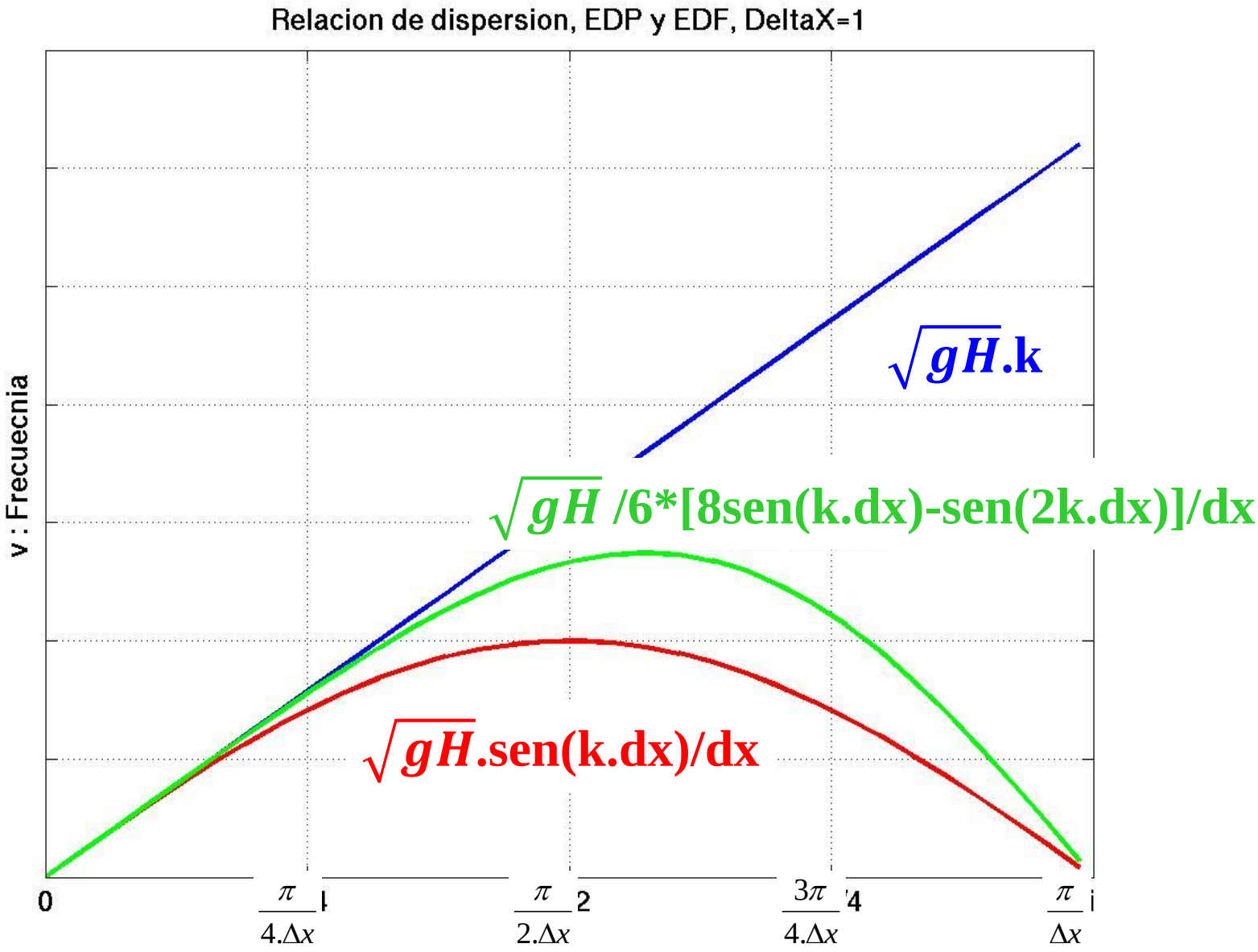

k: Número de onda



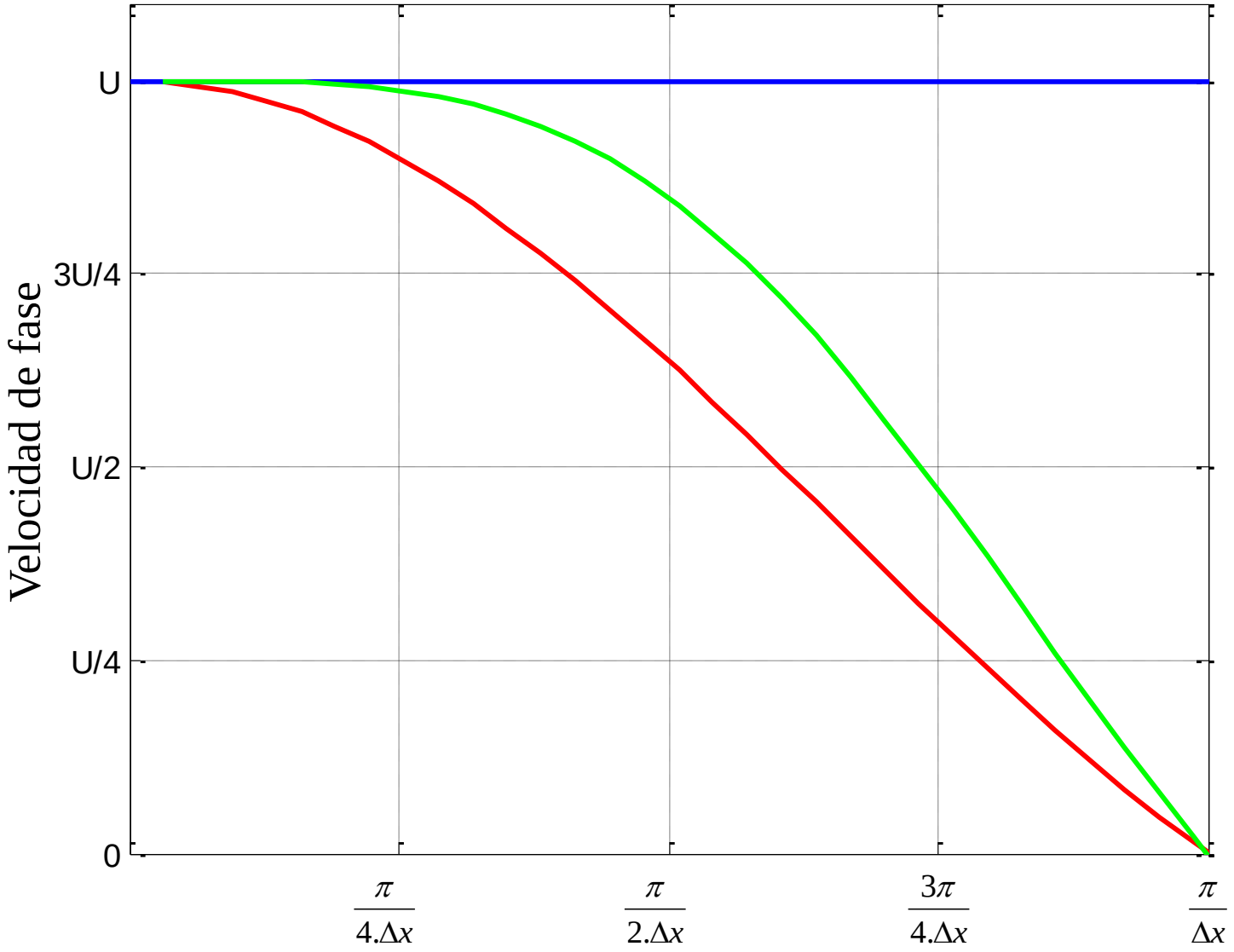

k: Número de onda

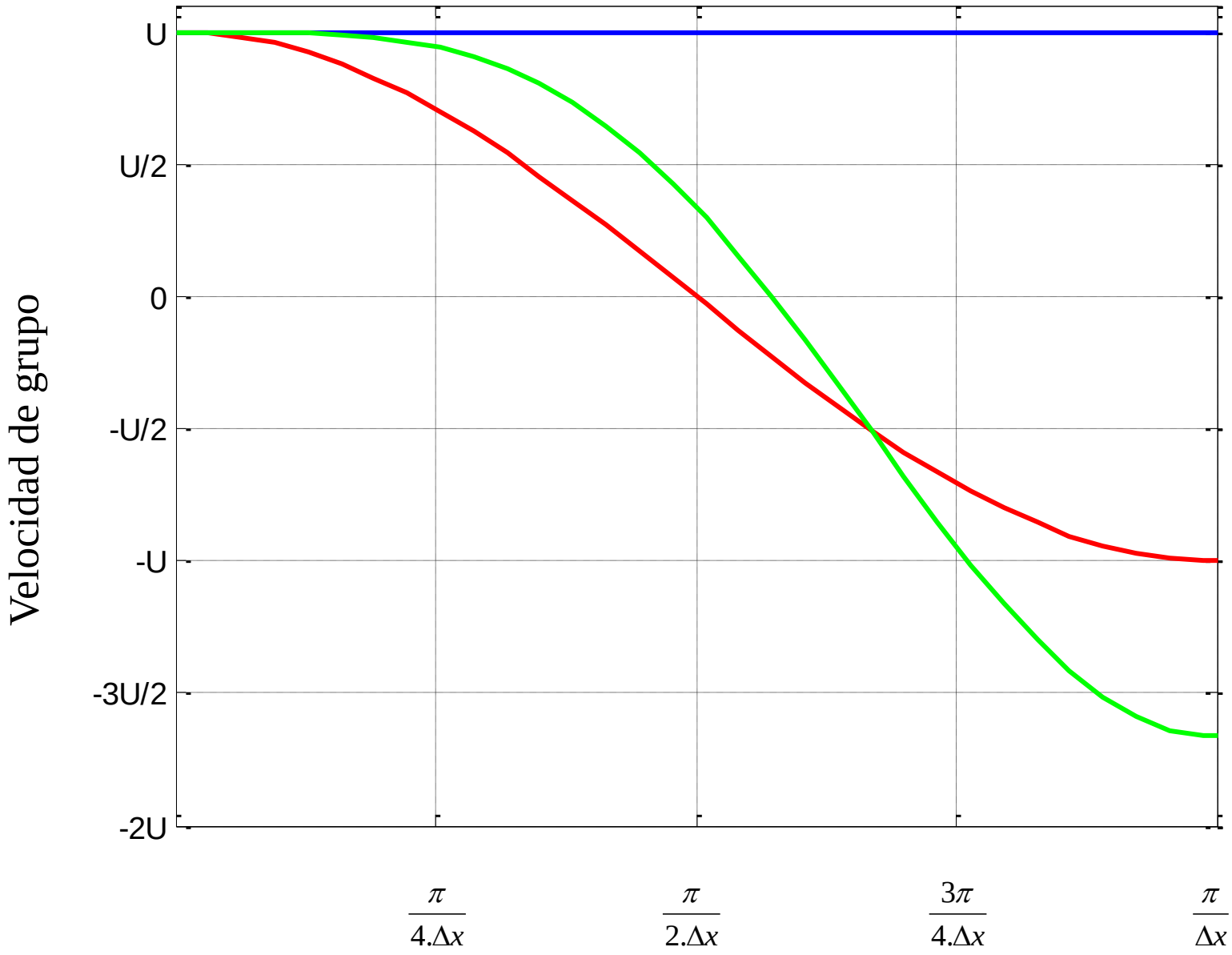

U
3U/4
U/2
U/4
0
Velocidad de fase
$\sqrt{gH}$.sen(k.dx)/(k.dx)
k1
k2
$\frac{\pi}{4.\Delta x}$
$\frac{\pi}{2.\Delta x}$
$\frac{3\pi}{4.\Delta x}$
$\frac{\pi}{\Delta x}$
k: Número de onda


Velocidad de grupo, EDP y EDF, DeltaX=1
U
U/2
0
-U/2
-U
Velocidad de grupo
$\sqrt{gH}.\cos(k.dx)$
k1
k2
0
$\frac{\pi}{4.\Delta x}$
$\frac{\pi}{2.\Delta x}$
$\frac{3\pi}{4.\Delta x}$
$\frac{\pi}{\Delta x}$
k: Número de onda




k: Número de onda


Velocidad de fase
U
3U/4
U/2
U/4
0
$\frac{\pi}{4.\Delta x}$
$\frac{\pi}{2.\Delta x}$
$\frac{3\pi}{4.\Delta x}$
$\frac{\pi}{\Delta x}$
k: Número de onda


Velocidad de grupo
U
U/2
0
-U/2
-U
-3U/2
-2U
$\frac{\pi}{4.\Delta x}$
$\frac{\pi}{2.\Delta x}$
$\frac{3\pi}{4.\Delta x}$
$\frac{\pi}{\Delta x}$
k: Número de onda

Aguas someras 1D

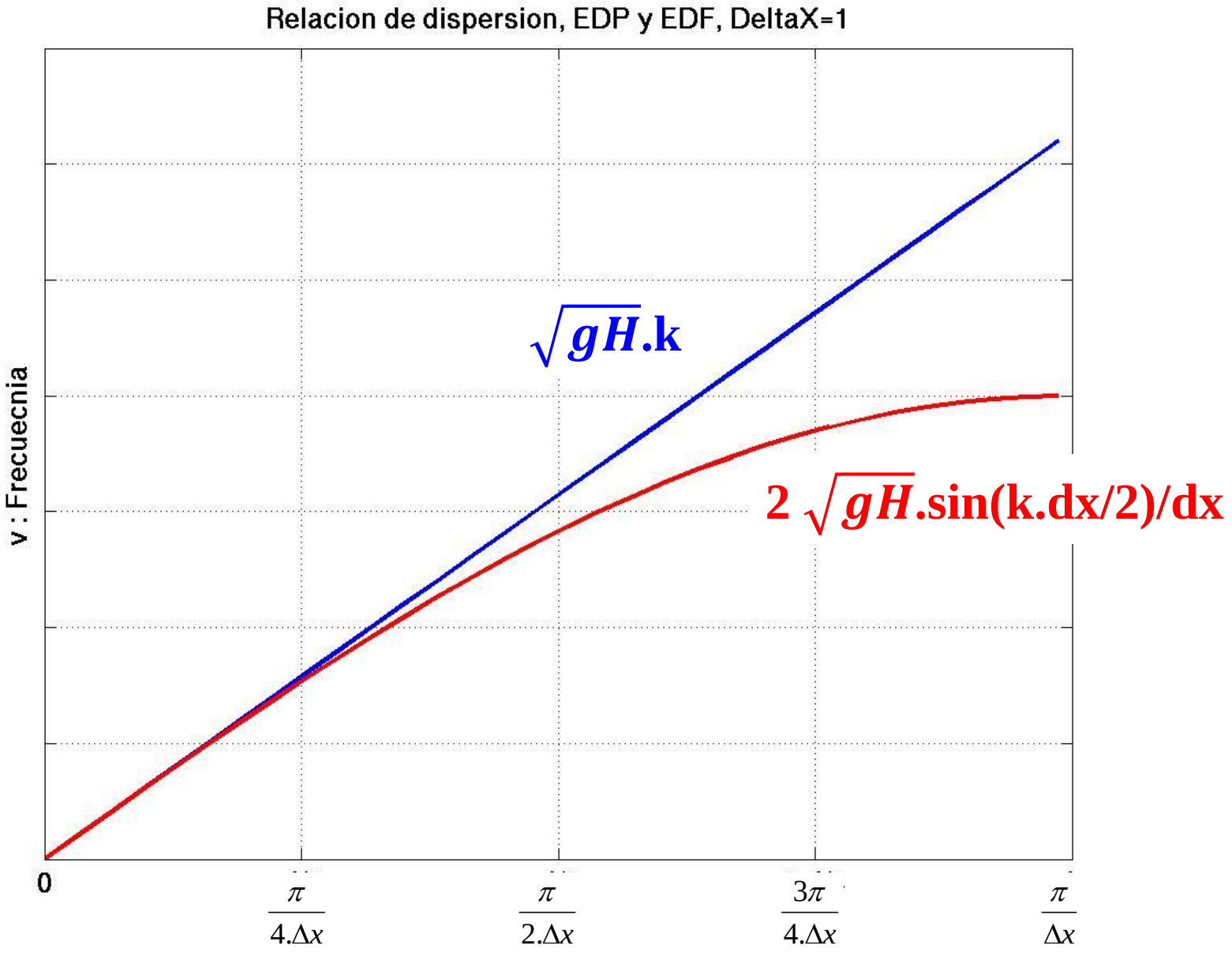
$$\frac{\partial u}{\partial t}+\mathrm{g}\,\frac{\partial h}{\partial x}=0$$

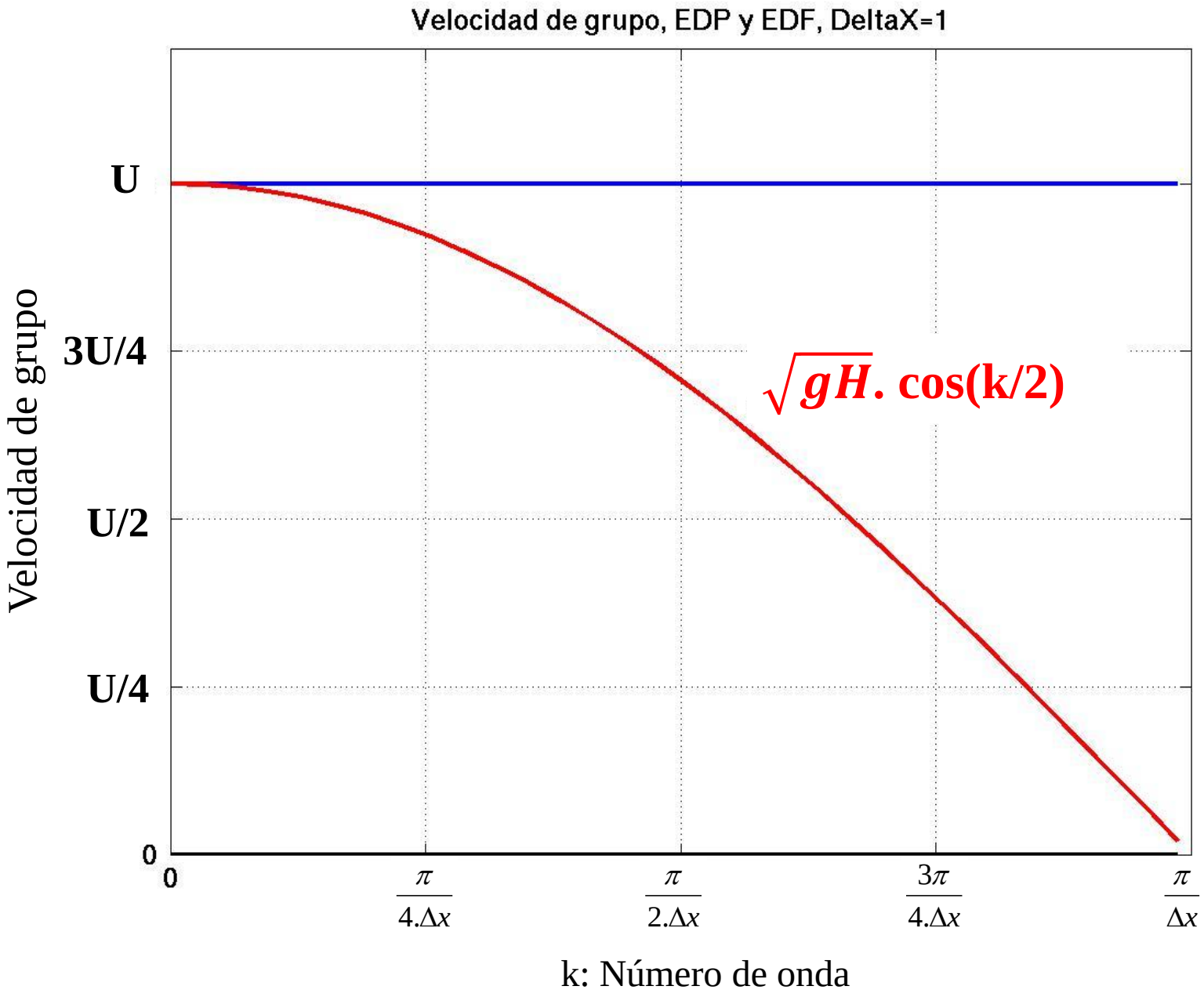
$$\frac{\partial h}{\partial t}+\mathrm{H}\,\frac{\partial u}{\partial x}=0$$

En Sistema continuo: $\upsilon = \pm\sqrt{\boldsymbol{gH}}.\mathrm{k}$

Discretizando solo la derivada especial,
en grilla intercalada para las variables u y h:

$$\upsilon = \sqrt{\boldsymbol{gH}}.\frac{\boldsymbol{sen}(\boldsymbol{k}.\boldsymbol{dx}/\boldsymbol{2})}{\boldsymbol{dx}/\boldsymbol{2}}$$


Relacion de dispersion, EDP y EDF, DeltaX=1
v : Frecuecnia
$\sqrt{gH}$.k
2 $\sqrt{gH}$.sin(k.dx/2)/dx
0
$\frac{\pi}{4.\Delta x}$
$\frac{\pi}{2.\Delta x}$
$\frac{3\pi}{4.\Delta x}$
$\frac{\pi}{\Delta x}$
k: Número de onda


Velocidad de grupo, EDP y EDF, DeltaX=1
Velocidad de grupo
U
3U/4
U/2
U/4
0
$\sqrt{gH}$. cos(k/2)
0
$\frac{\pi}{4.\Delta x}$
$\frac{\pi}{2.\Delta x}$
$\frac{3\pi}{4.\Delta x}$
$\frac{\pi}{\Delta x}$
k: Número de onda