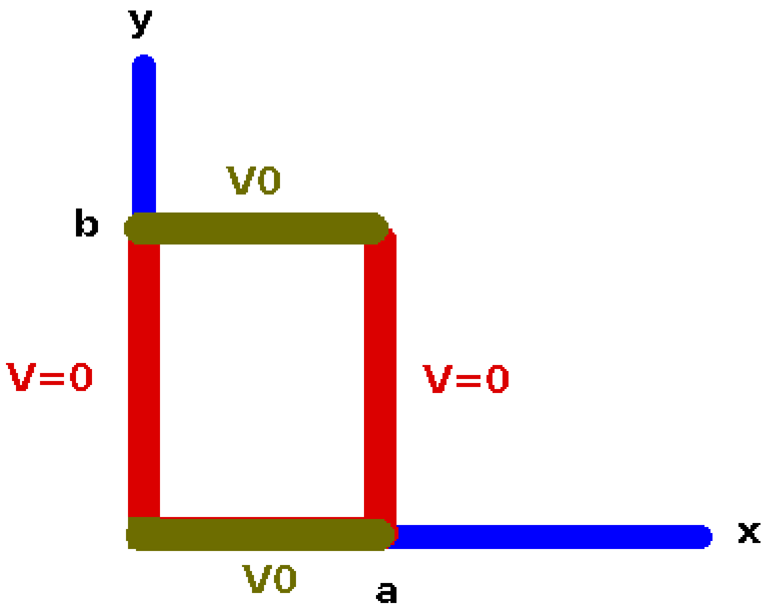

x=0, x=a V=0: y=0, y=b V=V_0

Solution:
Switch to the translated coordinate system which is:
x'=x; y'=y-f where f=b/2. Solve the problem in the primed coordinate system, losing the ' notations. (i.e. write in terms of b and without ' and f)

$$V(x,y)=(A\sin(kx)+B\cos(kx))(Ce^{ky}+De^{-ky})$$

$$@x=0, V=0 \Rightarrow B=0$$

$$@x=a, V=0 \Rightarrow ka=n\pi \Rightarrow k=\frac{n\pi}{a}$$

$$V(-b)=V(b) \Rightarrow C=D$$

$$V(x,y)=\sum_{n=0}^{\infty} A_n \sin\left(n\pi\frac{x}{a}\right)\cosh\left(n\pi\frac{y}{a}\right)$$

$$\int_{x=0}^{x=a} V(x,y)\sin\left(m\pi\frac{x}{a}\right)dx=\sum_{n=0}^{\infty} A_n\cosh\left(n\pi\frac{y}{a}\right)\int_{x=0}^{x=a}\sin\left(n\pi\frac{x}{a}\right)\sin\left(m\pi\frac{x}{a}\right)dx=A_m\cosh\left(m\pi\frac{y}{a}\right)\frac{a}{2}$$

$$@y=b;V=V_0$$

$$\int_{x=0}^{a}\sin\left(m\pi\frac{x}{a}\right)dx=-\left[\frac{a}{m\pi}\cos\left(m\pi\frac{x}{a}\right)\right]_0^a=\frac{-a}{m\pi}\left[(-1)^m-1\right]=\frac{2a}{m\pi}\begin{bmatrix}1;m\ \text{odd}\\0;m\ \text{even}\end{bmatrix}$$

$$\frac{V_0}{\cosh\left(m\pi\frac{b}{a}\right)}\frac{2a}{m\pi}=A_m(m\ \text{odd})$$

$$V(x,y)=\sum_{n=1,3,5,\ldots}^{\infty}\frac{2aV_0}{n\pi}\frac{\sinh\left(n\pi\frac{y}{a}\right)}{\cosh\left(n\pi\frac{b}{a}\right)}\sin\left(n\pi\frac{x}{a}\right)$$

now translate to original problem

$$V(x,y)=\sum_{n=1,3,5,\ldots}^{\infty}\frac{2aV_0}{n\pi}\frac{\sinh\left(n\pi\frac{(y+b/2)}{a}\right)}{\cosh\left(n\pi\frac{b/2}{a}\right)}\sin\left(n\pi\frac{x}{a}\right)$$