Cv5/2

Tedy $$c_n = \int_{-1/2}^{1/2} r e^{-2\pi i n r}\, dr = \int_{-1/2}^{1/2} \underbrace{\underset{\text{lichá}}{r}\,(\underset{\text{sudé}}{\cos 2\pi nr}}_{=0} - i \underset{\text{lichá}}{\sin 2\pi nr})\, dr =$$

$$= -2i \int_0^{1/2} \underset{\downarrow\, 1}{r}\, \underset{\downarrow\, -\frac{\cos 2\pi nr}{2\pi n}}{\sin 2\pi nr}\, dr$$

per partes

$$= +2i \left[r \frac{\cos 2\pi nr}{2\pi n} \right]_0^{1/2} + 2i \int_0^{1/2} \frac{\cos 2\pi nr}{2\pi n}\, dr$$

$$= + \frac{(-1)^n i}{2\pi n} + 2i \left[\frac{\sin 2\pi nr}{(2\pi n)^2} \right]_0^{1/2} = \frac{(-1)^{n+1}}{2\pi n} i$$

Tedy $(c_0 = 0)$

$$\tilde{w}(t,r) = \sum_{n \in \mathbb{Z}} \underbrace{\frac{\sin 2\pi k|n|t}{2\pi k|n|}}_{\text{sudé v } n} \underset{\text{lichá v } n}{\frac{(-1)^n}{2\pi n}}\, i \,(\underset{\text{sudé}}{\cos 2\pi nr} + i \underset{\text{lichá}}{\sin 2\pi nr})$$

$$= \sum_{n=1}^{\infty} \frac{\sin 2\pi k|n|t}{2\pi k|n|} \frac{(-1)^{n+1}}{\pi n} \sin 2\pi nr$$

$$\Rightarrow \boxed{v(t,r) = \sum_{n=1}^{\infty} (-1)^{n+1} \frac{\sin 2\pi knt}{2\pi^2 k n^2} \cdot \frac{\sin 2\pi nr}{r}}$$