PiotrŚmiałek

4.5*Potencjałelekromagnetyczny*

$$\frac{d^2\phi}{dx^2} = -\frac{\rho}{\epsilon_r}$$

$$\phi'(0) + \phi(0) = 5$$

$$\phi(3) = 2$$

$$\rho = 1$$

$$\epsilon_r(x) = \begin{cases} 10 & \text{dla } x \in [0,1] \\ 5 & \text{dla } x \in (1,2] \\ 1 & \text{dla } x \in (2,3] \end{cases}$$

Wyprowadzenie sformułowania wariancyjnego

$$\phi''(x) = -\frac{\rho}{\epsilon_r}$$

$$\phi''(x)v(x) = -\frac{\rho}{\epsilon_r}v(x)$$

$$\int_0^3 \phi''(x)v(x)\,dx = \int_0^3 -\frac{\rho}{\epsilon_r}v(x)dx$$

Z zasady całkowania przez części:

$$[\phi'(x)v(x)]_0^3 - \int_0^3 \phi'(x)v'(x)dx = \int_0^3 -\frac{\rho}{\epsilon_r}v(x)dx$$

$$\phi'(3)v(3) - \phi'(0)v(0) - \int_0^3 \phi'(x)v'(x)dx = \int_0^3 -\frac{\rho}{\epsilon_r}v(x)dx$$

$$\phi'(3) = 0 \text{ ponieważ } \phi(3) = 2$$

$$-\phi'(0)v(0) - \int_0^3 \phi'(x)v'(x)dx = \int_0^3 -\frac{\rho}{\epsilon_r}v(x)dx$$

Korzystając z podanych danych:

$$-(5 - \phi(0))v(0) - \int_0^3 \phi'(x)v'(x)dx = \int_0^3 -\frac{\rho}{\epsilon_r}v(x)dx$$

$$\phi(0)v(0) - 5v(0) - \int_0^3 \phi'(x)v'(x)dx = \int_0^3 -\frac{\rho}{\epsilon_r}v(x)dx$$

$$\phi(0)v(0) + \int_0^3 \phi'(x)v'(x)dx = -\int_0^3 \frac{\rho}{\epsilon_r}v(x)dx + 5v(0)$$

$$B(\phi, v) = L(v)$$

$$\phi = \hat{\phi} + w$$

$$\hat{\phi} = 2e_n$$

$$B(\hat{\phi} + w, v) = L(v)$$

$$B(w, v) = L(v) - B(\hat{\phi}, v)$$

$$B(w, v) = L(v) - B(2e_n, v)$$

$$B(w, v) = L(v) - 2B(e_n, v)$$

$$B(w,v) = \hat{L}(v)$$