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Potencjał elektryczny

Sformułowanie silne

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

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

$$\phi(3) = 2$$

$$\rho = 1$$

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

Gdzie poszukiwana funkcja to $\phi(x)$

$$[0,3] \ni x \to \phi(x) \in \mathbb{R}$$

Przekształcenie do sformułowania słabego

$$\phi'' = -\frac{\rho}{\epsilon_r}$$

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

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

$$[\phi' v']_0^3 + \int_0^3 \phi' v' dx = -\frac{1}{10}\int_0^1 v dx - \frac{1}{5}\int_1^2 v dx - \int_2^3 v dx$$

$$\phi'(3)v(3) - \phi'(0)v(0) - \int_0^3 \phi' v' dx = -\frac{1}{10}\int_0^1 v dx - \frac{1}{5}\int_1^2 v dx - \int_2^3 v dx$$

$$-(5 - \phi(0))v(0) - \int_0^3 \phi' v' dx = -\frac{1}{10}\int_0^1 v dx - \frac{1}{5}\int_1^2 v dx - \int_2^3 v dx$$

$$\phi(0)v(0) - \int_0^3 \phi' v' dx = -\frac{1}{10}\int_0^1 v dx - \frac{1}{5}\int_1^2 v dx - \int_2^3 v dx + 5v(0)$$

$$B(\phi, v) = B(w + \tilde{u}, v) = B(w, v) + B(\tilde{u}, v)$$

$$B(w, v) = L(v) + B(\tilde{u}, v)$$