

Методические указания. Лабораторная работа № 3

Вносим в систему количество необходимых суммирований и собственные значения:

count:=50

$\nu[n_]:= \frac{\pi * n}{6}; \mu[m_]:= \frac{\pi * m}{8};$

$\lambda[n_ , m_]:= \text{Sqrt}[(\nu[n])^2 + (\mu[m])^2]$

Вводим полученное аналитическое решение:

$$u[x_ , y_ , z_]:= z * \text{Sin}[x + y] + \frac{3}{4} * x + 43.2 * (\text{Cosh}[\lambda[0, 7] * x] - \text{Coth}[4 * \lambda[0, 7]] * \text{Sinh}[\lambda[0, 7] * x]) * \\ \text{Cos}\left[\frac{7 * \pi}{8} * z\right] + \frac{1}{\text{Sinh}[4 * \lambda[1, 9]]} * \text{Sinh}[\lambda[1, 9] * x] * \text{Cos}\left[\frac{\pi}{6} * y\right] * \text{Cos}\left[\frac{9\pi}{8} * z\right] + \\ \sum_{n=1}^{\text{count}} \left(\frac{-31104 * (1 + (-1)^n)}{\pi^4 * n^4} * (\text{Cosh}[\lambda[n, 7] * x] - \text{Coth}[4 * \lambda[n, 7]] * \text{Sinh}[\lambda[n, 7] * x]) * \right. \\ \left. \text{Cos}\left[\frac{\pi * n}{6} * y\right] * \text{Cos}\left[\frac{7 * \pi}{8} * z\right] \right) + \frac{x^3}{2} + \frac{x^2}{2} - \frac{4}{3} * \text{Sin}[6] * \text{Sin}[x] - \frac{8}{3} * \text{Sin}[3]^2 * \text{Cos}[x] + \\ \left(\frac{1}{3} * \text{Sin}[6] * \text{Sin}[4] + \frac{2}{3} * \text{Sin}[3]^2 * \text{Cos}[4] - \frac{2}{3} * \text{Sin}[3]^2 - 10 \right) * x + \frac{8}{3} * \text{Sin}[3]^2$$

Построим векторное поле электрической напряжённости:

VectorPlot3D[Evaluate[-Grad[u[x, y, z], {x, y, z}]], {x, 0, 4}, {y, 0, 6}, {z, 0, 8}]

