T U T O R I A L

“Computational Electromagnetics”

to the lecture

“Numerical Methods in Electrical Engineering”

Tutorial 08 Thursday, July 1, 2010 (Time: 15:30 – 16:15; Room: T 212)

Let $\Omega \subset \mathbf{R}^2$ be a simply connected, bounded Lipschitz domain, and let us define the finite element spaces

$$\begin{aligned} W_h &= \{w \in H^1(\Omega)|_{\mathbf{R}} : \ w|_T \in P_1\} \subset H^1(\Omega), && (2.1) \\ V_h &= \{v \in H(curl, \Omega) : \ v|_T \in \mathcal{N}\} \subset H(curl, \Omega), && (2.2) \\ S_h &= \{s \in L_2(\Omega) : \ s|_T \in P_0\} \subset L_2(\Omega). && (2.3) \end{aligned}$$

Theoerm 3.9 of the Lectures claims that these finite element spaces form a discrete complete sequence:

$$W_h \xrightarrow{\nabla} V_h \xrightarrow{curl} S_h \tag{2.4}$$

27 Show that

$$\nabla W_h = \{v_h \in V_h : curl(v_h) = 0\}.$$

28 Show that

$$curl\, V_h = S_h.$$