Errata et Addenda

After the review process and the discussion during the defense, I ask the kind reader to take into account the following corrections:

- The proof of DBVP in Appendix B does *not* imply existence and uniqueness of the problem (2.51–2.53). It remains an open question, whether these can be proved in the case of integral boundary conditions (2.26–2.27).

- In DBVP formulation (B1–B2), the scalar magnetic potential must satisfy $U(t_{i+1}) \in W^{2,2}(G)$, so that $\operatorname{grad} U(t_{i+1}) \in W^{1,2}1, 2(G)^3$.

- In formulation (3.39–3.41) should be

$$\boldsymbol{A}(\boldsymbol{r};t), \delta\boldsymbol{A}(\boldsymbol{r};t) \in \left\{ \boldsymbol{f} \in W_{01}^{1,2}(G)^3 \times C^1\left(\langle 0,\infty)\right)^3 | \boldsymbol{n}\cdot\boldsymbol{f} = 0 \quad \text{on}\, \partial G_2 \right\}.$$

However, the boundary condition (3.11) cannot be directly implemented in the construction of discrete approximation of the solution functional space, since the normal and tangential components of vectors are not separated in the nodal finite element parameterization. Therefore it is "silently ignored" in the discretization (see also Everett and Schultz, 1996). However the A_r component on the surface ∂G_2 is close to numerical zero in the presented runs (see Figure 3.4).

- Boundary conditions (3.14–3.15) imposed on the surface ∂G_1 of the infinitely conductive core imply for the EM field vectors,

$$\begin{array}{rcccl}
\boldsymbol{n}\times\boldsymbol{E} & = & -\boldsymbol{n}\times\left(\frac{\partial\boldsymbol{A}}{\partial t} + \operatorname{grad}\Phi\right) & = & 0,\\
\boldsymbol{n}\cdot\boldsymbol{D} & = & -\epsilon\,\boldsymbol{n}\cdot\left(\frac{\partial A}{\partial t} + \operatorname{grad}\Phi\right) & = & \rho_S,\\
\boldsymbol{n}\times\boldsymbol{H} & = & \mu_0\,\boldsymbol{n}\times\operatorname{curl}\boldsymbol{A} & = & \boldsymbol{j}_S,\\
\boldsymbol{n}\cdot\boldsymbol{B} & = & \boldsymbol{n}\cdot\operatorname{curl}\boldsymbol{A} & = & 0,
\end{array}$$

on ∂G_1, where ρ_S, and $\boldsymbol{j}_S$ are respectively the surface charges and surface currents generated on the surface of the perfect conductor.

- Indeces in equations (2.58) and (2.68–2.70) are misprinted. The correct formulae are

$$\left(\psi_k\,\overline{\mathbf{S}}^{(\lambda)}_{jm}, \psi_{k'}\,\mathbf{S}^{(\lambda')}_{j'm'}\right) = \delta_{jj'}\,\delta_{mm'}\,\delta_{\lambda\lambda'}\,N_{j\lambda}\left[I^{(2)}_k\,\delta_{k(k'-1)} + \left(I^{(1)}_k + I^{(3)}_{k-1}\right)\delta_{kk'} + I^{(2)}_{k-1}\,\delta_{k(k'+1)}\right], \tag{2.58}$$

$$
\begin{aligned}
a_0\left(\psi_k\,\overline{\mathbf{S}}^{(\lambda)}_{jm},\psi_{k'}\,\mathbf{S}^{(0)}_{j'm'}\right) &= \delta_{jj'}\,\delta_{mm'}\,\delta_{\lambda 0}\,\Pi_j\Bigg[\left(\Pi_j K^{(2)}_k + K^{(5)}_k\right)\rho_{0,k}\,\delta_{k(k'-1)} + \\
&+ \left(\Pi_j K^{(3)}_{k-1} + K^{(6)}_{k-1}\right)\rho_{0,k-1}\,\delta_{kk'} + \left(\Pi_j K^{(1)}_k + K^{(4)}_k\right)\rho_{0,k}\,\delta_{kk'} + \\
&+ \left(\Pi_j\, K^{(2)}_{k-1} + K^{(5)}_{k-1}\right)\rho_{0,k-1}\,\delta_{k(k'+1)}\Bigg], \qquad (2.68)\\
a_0\left(\psi_k\,\overline{\mathbf{S}}^{(\lambda)}_{jm},\psi_{k'}\,\mathbf{S}^{(-1)}_{j'm'}\right) &= \delta_{jj'}\,\delta_{mm'}\,\delta_{\lambda\,-1}\,\Pi_j\Bigg[K^{(2)}_k\,\rho_{0,k}\,\delta_{k(k'-1)} + K^{(3)}_{k-1}\,\rho_{0,k-1}\,\delta_{kk'} + \\
&+ K^{(1)}_k\,\rho_{0,k}\,\delta_{kk'} + K^{(2)}_{k-1}\,\rho_{0,k-1}\,\delta_{k(k'+1)}\Bigg] - \\
&- \delta_{jj'}\,\delta_{mm'}\,\delta_{\lambda 1}\,\Pi_j\Bigg[K^{(8)}_k\,\rho_{0,k}\,\delta_{k(k'-1)} + K^{(10)}_{k-1}\,\rho_{0,k-1}\,\delta_{kk'} + \\
&+ K^{(7)}_k\,\rho_{0,k}\,\delta_{kk'} + K^{(9)}_{k-1}\,\rho_{0,k-1}\,\delta_{k(k'+1)}\Bigg], \qquad (2.69)\\
a_0\left(\psi_k\,\overline{\mathbf{S}}^{(\lambda)}_{jm},\psi_{k'}\,\mathbf{S}^{(1)}_{j'm'}\right) &= -\delta_{jj'}\,\delta_{mm'}\,\delta_{\lambda\,-1}\,\Pi_j\Bigg[K^{(9)}_k\,\rho_{0,k}\,\delta_{k(k'-1)} + K^{(10)}_{k-1}\,\rho_{0,k-1}\,\delta_{kk'} + \\
&+ K^{(7)}_k\,\rho_{0,k}\,\delta_{kk'} + K^{(8)}_{k-1}\,\rho_{0,k-1}\,\delta_{k(k'+1)}\Bigg] + \\
&+ \delta_{jj'}\,\delta_{mm'}\,\delta_{\lambda 1}\,\Pi_j\Bigg[K^{(5)}_k\,\rho_{0,k}\,\delta_{k(k'-1)} + K^{(6)}_{k-1}\,\rho_{0,k-1}\,\delta_{kk'} + \\
&+ K^{(4)}_k\,\rho_{0,k}\,\delta_{kk'} + K^{(5)}_{k-1}\,\rho_{0,k-1}\,\delta_{k(k'+1)}\Bigg]. \qquad (2.70)
\end{aligned}
$$

- Equation (3.1) should be

$$\boldsymbol{B} = \operatorname{curl}\boldsymbol{A}. \qquad (3.1)$$

I apologize to all English native speakers for the way I treated the language. And finally, I thank my reviewers, Heather MacCreadie, Ctirad Matyska, and Josef Pek for their comments that helped to clarify the above mentioned matters.

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