Corrections to "Analytical Expressions for High-Frequency VLSI Interconnect Impedance Extraction in the Presence of a Multilayer Conductive Substrate"

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In our paper [1], there was an error in (17). The expression for the term $q(\lambda)$ should be

$$q(\lambda)=\frac{\left[(m_1+m_2)(m_2-m_3)+(m_1-m_2)(m_2+m_3)e^{2m_2z_2}\right]}{\left[(m_1-m_2)(m_2-m_3)+(m_1+m_2)(m_2+m_3)e^{2m_2z_2}\right]}. \quad (1)$$

This affects the evaluation of the term $g_N(\lambda)$ for a 3-layer substrate ($N = 3$). For the experiments shown in this paper, we have chosen the thickness of the two top layers $z_1 = z_2 = 1\mu$m. In all these cases, the effect of this change is negligible (fourth significant digit and beyond) for the relevant frequencies and substrate resistivities. However, for the general case, the wrong expression may introduce a larger error.

Equation (15) in the same paper should be modified, the correct expression being

$$G^{\text{hor}}_{0,\text{dipole}}(x, z, x' = 0, z') = \begin{cases} -\int_0^\infty \left(e^{-|z-z'|\lambda} + g_N(\lambda)e^{-(z+z')\lambda}\right)\cos(\lambda x)d\lambda & z > z' \\ -\int_0^\infty \left(-e^{-|z-z'|\lambda} + g_N(\lambda)e^{-(z+z')\lambda}\right)\cos(\lambda x)d\lambda & z < z'. \end{cases} \quad (2)$$

Accordingly, (22) becomes

$$G^{\text{hor}}_{0,\text{dipole}}(x, z, z') = -\left[\frac{z-z'}{(z-z')^2+x^2} + \sum_{k=1}^{K}\left(\beta_k \frac{z+z'+\dfrac{\alpha_k}{\gamma_1}}{\left(z+z'+\dfrac{\alpha_k}{\gamma_1}\right)^2+x^2}\right)\right]. \quad (3)$$

Subsequent expressions shown in the appendix, and the results, remain unaffected by this change.

REFERENCES

[1] N. Srivastava, R. Suaya, and K. Banerjee, "Analytical expressions for high-frequency VLSI interconnect impedance extraction in the presence of a multilayer conductive substrate," *IEEE Trans. Comput.-Aided Design Integr. Circuits Syst.*, vol. 28, no. 7, pp. 1047–1060, Jul. 2009.

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