Corrections to "Temperature Correction for Cylindrical Cavity Perturbation Measurements"

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IN THE above paper [1], it has come to the attention of the authors that a typographical error exists in (16) and (17). The error, while small in syntax, has a large impact on the understanding behind the explained technique. Reference [1, eq. (15)] states that by subtracting the fractional frequency shifts of the sample perturbed and the unperturbed case, any resultant fractional frequency shift is caused by the temperature dependent properties of the sample, if any. Now, the printed and erroneous [1, eq. (16)] should be

$$\varepsilon_1(T) \approx -2\left[\frac{f_s(T) - f_0(0)}{f_0(0)}\right]\frac{V_c}{V_s}G_{\text{mnp}} + 1. \tag{1}$$

We note that (16) incorrectly states that the unperturbed frequency (f_0) is a function of temperature. This is incorrect since all temperature dependence in the unperturbed state is already addressed in [1, eq. (15)]. Additionally, the fractional frequency shift is normally taken with respect to the reference unperturbed frequency f_0 as opposed to f_s; however, since the relative difference in f_s and f_0 is small at gigahertz frequencies, this is not a large issue. Reference [1, eq. (16)] should be printed as (1), where $f_s(T) = f_s(0) \times (1 + ((\Delta f_s(T))/(f_s(0))))$ is the temperature dependent frequency while the erroneous $f_0(T)$ has been replaced with $f_0(0)$, the unperturbed frequency taken at a reference temperature. All temperature dependence is addressed in $f_s(T)$ and if there was no temperature dependence, $f_s(T)$ would be a constant and the original cavity perturbation approximation would apply. Similarly, [1, eq. (17)] should be printed as

$$\varepsilon_2(T) \approx \left[\frac{1}{Q_s(T)} - \frac{1}{Q_0(0)}\right]\frac{V_c}{V_s}G_{\text{mnp}} \tag{2}$$

where $(1/(Q_s(T))) = ((\text{BW}_s(0))/(f_s(T))) \times (1 + ((\Delta \text{BW}_s(T))/(\text{BW}_s(0))))$ is the reciprocal of the temperature dependent quality factor and $Q_0(T)$ has been replaced with $Q_0(0)$ which is the unperturbed quality factor at a reference temperature.

REFERENCES

[1] J. A. Cuenca, D. R. Slocombe, and A. Porch, "Temperature correction for cylindrical cavity perturbation measurements," *IEEE Trans. Microw. Theory Techn.*, vol. 65, no. 6, pp. 2153–2161, Jun. 2017.

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