where R_s is the real part of the surface impedance of the metal forming the resonator.

If $Z_0(0)$ be chosen 60 ohms and

$$\alpha \to 0$$

then the Q of the resonator becomes

$$\frac{240\pi^2}{R_s}\left(8 + \frac{\lambda}{a} + \frac{\lambda}{b}\right)^{-1}.$$

It is interesting to note that, when

$$\alpha \to 0$$

the exponential-line resonator becomes a uniform-line resonator and the Q of such resonator[6] is

$$\frac{240\pi^2}{R_s}\left(8 + \frac{\lambda}{a} + \frac{\lambda}{b}\right)^{-1}.$$

The characteristic impedance of the lines is assumed to be the same in both cases.

The Q can be determined alternatively from the input reflection coefficient already derived. But the evaluation of Q from the field integrals reveals the characteristics of the resonator from the energy consideration.

Fig. 5 shows a comparison of Q for uniform-line and exponential-line resonators for different values of α/β, when $Z_0(0) = 30$ ohms.

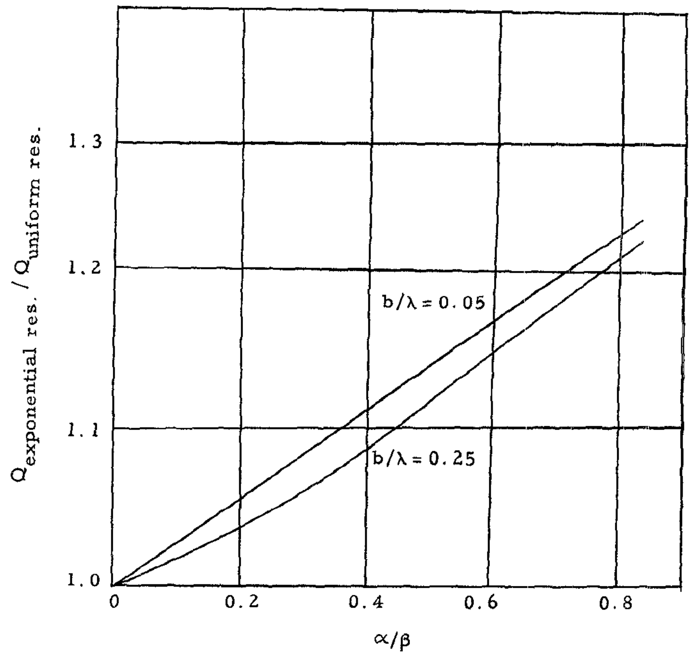

Fig. 5—Q gain in exponential resonator. Cavity length $= \dfrac{\lambda}{4\sqrt{1-\dfrac{\alpha^2}{4\beta^2}}}$.

Conclusion

An attempt has been made in this paper to describe a method by which the reflection coefficient of an exponential-line transformer can be determined readily, from the Smith Chart, particularly when a frequency-sensitive load or a transmission line whose input impedance changes with frequency is terminated at the load end. Analyses of this nature may be helpful in obtaining the optimum design parameters for the transformer for any specific load. Also discussed is the possibility of using the exponential-line resonator to indicate how, for some range of $Z_0(0)$, the Q of an exponential resonator can be increased greatly in excess of what would be expected in a uniform-line resonator for the same type of resonance. Similar analyses can be made for other nonuniform line resonators.[7]

[6] *Ibid.*, p. 280.

[7] R. N. Ghose, "Synthesis of Nonuniform Line," thesis submitted in partial fulfillment of requirements for degree of electrical engineer, Univ. of Ill.; 1956.

Correction

Tore N. Anderson, author of the paper "Rectangular and Ridge Waveguide," which appeared on pages 201–209 of the October, 1956 issue of these TRANSACTIONS, regrets the omission of the following reference. The illustration in Fig. 8 and the general equation for deflection of pressurized waveguide were obtained from James L. Briggs and Joseph B. Brauer, Technical Note RADC-TN-54-10, p. 3; August, 1954.