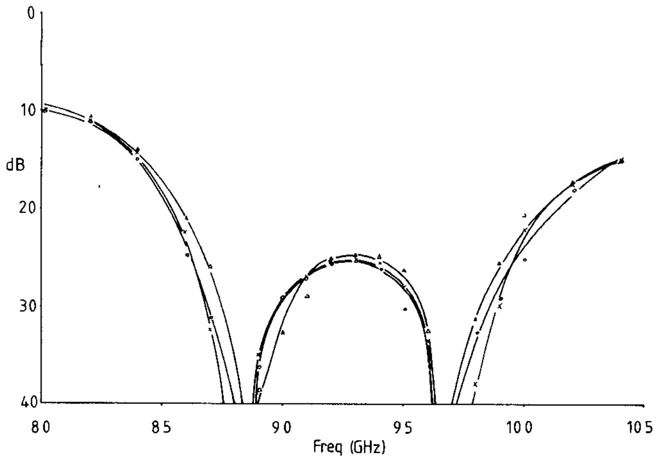

Fig. 11. Susceptance slope parameter of degenerate counter-rotating eigennetworks for single and coupled disk resonators.

tions using a single resonator in keeping with some experimental work elsewhere [10], [11].

The experimental data obtained here on the degenerate counter-rotating eigennetworks are deemed, if anything, more accurate than similar previously reported material on them in that they do not rely on the assumption that the in-phase eigennetwork has been idealized by a frequency independent short-circuit boundary condition.

VI. Conclusions

An important quantity in the physical design of waveguide circulators using turnstile junctions is the adjustment of the in-phase mode. This paper describes four simple measurements which permits this adjustment to be determined. The relationship between the radial wavenumber, the filling factor, and the dielectric constant of the region between the open face of the ferrite region and the image wall is given in polynomial form for both single and coupled disk resonators and is in keeping with the qualitative appreciation of this eigennetwork. One important conclusion of this work is that the in-phase eigennetworks of turnstile junctions using either resonators are identical. The experimental procedure outlined here also permits the accurate construction of the mode chart of the degenerate counter-rotating modes and a complete description of the first circulation relationship of this class of device.

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Letters

Comments on "Optical Injection Locking of BARITT Oscillators"

A. J. SEEDS, MEMBER, IEEE, AND J. R. FORREST, MEMBER, IEEE

We were interested to read the above short paper,[1] but would like to point out that experimental results on the optical injection locking of IMPATT oscillators have indeed been obtained. Over the last few years, reports of such experiments have appeared in the literature from groups in both Europe [1], [2] and the U.S.A. [3].

While optically injection-locked BARITT oscillators may find application in microwave receivers, their use as transmitter elements in phased-array radar systems, as proposed by the authors of the above paper,[1] would seem to be limited by their rather restricted output power capabilities [4]. It should also be noted that optically generated carriers in IMPATT diodes benefit from the avalanche multiplication inherent in the operation of the device, leading to a considerable improvement in locking range for a given optical power [2]. Such a gain mechanism is not available in the BARITT diode.

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Further Comments on "Integration Method of Measuring Q of the Microwave Resonators"

P. L. OVERFELT AND D. J. WHITE

In reply to our comments [1] concerning his paper,[1] I. Kneppo showed an exact integration of the expression

$$P(\omega) = P_0\left[1 + Q_L^2(\omega/\omega_0 - \omega_0/\omega)^2\right]^{-1} \tag{1}$$

between the limits ω_1 and ω_2 by the substitution of variables, $x = \omega/\omega_0 - \omega_0/\omega$, and a simplifying choice of limits symmetrical in x

$$I = \int_{\omega_1}^{\omega_2} P(\omega)\,d\omega = P_0\omega_0 Q_L^{-1}\tan^{-1}\left(Q_L\omega_2\omega_0^{-1}\right). \tag{2}$$

Limits symmetrical about $x = 0$ amount to the condition

$$\omega_1\omega_2 = \omega_0^2 \tag{3}$$

and when this relation holds, (2) is exact as may be verified by substituting (3) into the general expression for I, regardless of integration limits

$$I = \frac{P_0\omega_0}{2Q_L}\left\{\tan^{-1}\left[\omega_0 Q_L \frac{\omega_2(\omega_0^2-\omega_1^2) - \omega_1(\omega_0^2-\omega_2^2)}{(\omega_0^2-\omega_1^2)(\omega_0^2-\omega_2^2)Q_L^2 + \omega_1\omega_2\omega_0^2}\right]\right.$$
$$-2\frac{1}{\sqrt{4Q^2-1}}\ln\left[\frac{(\omega_0^2+\omega_2^2)Q_L + \omega_2\omega_0\sqrt{4Q_L^2-1}}{(\omega_0^2+\omega_2^2)Q_L - \omega_2\omega_0\sqrt{4Q_L^2-1}}\right.$$
$$\left.\left.\cdot\frac{(\omega_0^2+\omega_1^2)Q_L - \omega_1\omega_0\sqrt{4Q_L^2-1}}{(\omega_2^2+\omega_1^2)Q_L + \omega_1\omega_0\sqrt{4Q_L^2-1}}\right]\right\} \tag{4}$$

and using the identity

$$2\tan^{-1}a = \tan^{-1}\frac{2a}{1-a^2}. \tag{5}$$

We had assumed [1] integration limits symmetrical in ω_0

$$\omega_1 = \omega_0 - \omega_s/2$$
$$\omega_2 = \omega_0 + \omega_s/2 \tag{6}$$

rather than x, but this does not account for the difference between our results and Kneppo's for typical microwave cavities.

Unfortunately, (7) in [1] omitted the square on Q_L in the denominator of the $\tan^{-1}$ term, this equation being otherwise identical to (4) of this note. Thus, our approximations for the case $Q_L \gg 1$, $\omega_0 \gg \omega_s$ were in error. When (6) is substituted in (4), given these conditions, Kneppo's (2) results.

It follows that (8) and (9) in our comments [1] are in error and that (10) should read

$$I = 2\pi P_0 \Delta f \tan^{-1} k. \tag{7}$$

In any case, the method of integrating (1) between general limits is of much interest, and (4) does allow asymmetrical limits for experimental integration. For example, integrating between the 3-dB and the resonant frequencies (setting ω_1 or ω_2 equal to ω_0) gives

$$\frac{I}{P_0} = \frac{\pi^2\Delta f}{4} \tag{8}$$

where Δf is the 3-dB bandwidth. This expression should allow a check on the symmetry of the resonance curve and, hence, show how good a description of the cavity resonance (1) actually is.

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Comments on "New Narrow-Band Dual-Mode Bandstop Waveguide Filters"

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I have read the above paper[1] with interest, but find some possible discrepancies between the data presented in Fig. 4 and the data presented in Fig. 6. It seems to me that the data in Fig. 4 is probably accurate, reflecting as it does the rejection obtainable through a single pair of ports coupling to a dominant mode propagating waveguide. No matter how the multiple pole filter is synthesized in the concept discussed by the authors, the shunt coupled bandpass filter is coupled only by a pair of couplings to the main line. Thus, the limitation on the depth of the obtainable rejection is determined by two factors: 1) orthogonality of the two coupling irises, and 2) return loss of the two coupling irises.

The data of Fig. 6 implies an input return loss for the bandpass filter and a value for the coupling iris isolation of over 50 dB, values which do not seem very likely. The data of Fig. 4 shows

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