Letters

Comments on "Spectral Domain Analysis of an Elliptical Microstrip Ring Resonator"

W. C. CHEW

Along with the above paper,[1] several other papers have been published recently by Sharma and his co-workers [2]–[3] on the analysis of the resonant frequencies of a microstrip disk using the quasi-static approach. The quasi-static approach has been proven to be incorrect in [4] and [5]. The quasi-static argument on the correction to the resonant frequencies of a microstrip disk is based on some intuitive arguments that are not rigorous. The only thing it predicts correctly is that the resonant frequencies of a microstrip disk should decrease compared to that of a magnetic-wall model. The author may argue that since the correction to the magnetic-wall model is small, any approximate method is viable. However, we have found that the quasi-static correction could be as much as 50 percent in error. Even when this correction is small, if we bother to calculate it, I think we should calculate it correctly.

The author's quasi-static correction has a new twist compared to earlier authors, but when $\epsilon_r = 1$, it does not differ from the quasi-static correction of earlier work.

Reply[2] by Arvind K. Sharma[3]

A procedure for the evaluation of resonant frequency of a microstrip resonant structure has been presented in the above paper[1] and in the related papers [2] and [3]. The approach consists of utilizing the quasi-static capacitance of the structure to quantitatively assess the effect of fringing of fields associated with the structure. The resonant frequency is then evaluated taking into account the effective structural parameters and effective dielectric constant. This is further verified with the experiment to assess the validity of the procedure. This approach has been utilized, in the past, to analyze other geometrical shapes [6]–[10].

Of course, it will be useful to have an accurate description of the effect of fringing of fields. It can be accomplished only through a rigorous full-wave analytical solution. But, for microstrip resonant structures of complex geometrical shapes, it is tedious and the numerical evaluation is extremely time consuming.

On the other hand, the procedure described in the above paper[1] is relatively straight forward and simple to implement. Also, it can easily be incorporated in CAD programs, such as MIDAS [11]. In any case, since the theoretical resonant frequency is in good agreement (typically within ± 2 percent) with the experiments, the results can be used with confidence.

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[1] A. K. Sharma, *IEEE Trans. Microwave Theory Tech.*, vol. MTT-32, pp. 212–218, Feb. 1984.

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[2] Manuscript received October 29, 1985.

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Comments on "The Hybrid-Mode Analysis of Coupled Microstrip-Slot Resonators"

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We were interested to read the above paper,[1] but it calls for a remark concerning the extension of the hybrid-mode analysis to coupled microstrip-slot resonator. In fact, when the coupled strips are very close to each other, the basis functions used in the above paper does not allow one to obtain a satisfactory resonant

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