

SPECTRAL DOMAIN ANALYSIS OF
MICROSTRIP RESONANT STRUCTURES

by

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CERTIFICATE

This is to certify that the dissertation entitled "Spectral Domain Analysis of Microstrip Resonant Structures", which is being submitted by Mr. Arvind Kumar Sharma to the Indian Institute of Technology, Delhi, for the award of degree of Doctor of Philosophy, is a record of bonafide research work carried out by him under my guidance and supervision.

In my opinion, this dissertation has reached the standard fulfilling the requirements of the regulations relating to the degree. The results contained in it have not been submitted, in part or in full, to any other university or institute for the award of any degree or diploma.

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ABSTRACT

This dissertation presents theoretical analysis and experimental verification of rectangular microstrip resonators with discontinuities, isosceles triangular microstrip resonators, and interacting rectangular microstrip resonators. A complete analysis of these physical shapes is attempted using the spectral domain technique. The characterization under quasi-static approach is obtained in terms of capacitance, effective dielectric constant and resonant frequency. Accurate computation of resonant frequency is achieved using the full-wave approach. Studies on rectangular microstrip resonators with discontinuities include symmetrical, asymmetrical step-change in width and with a transverse slot. The isosceles triangular microstrip resonator is analyzed for various apex angles. Interacting rectangular microstrip resonant structures include half-wave, quarter-wave parallel-coupled and end coupled configurations.

The resonant frequencies under quasi-static approach provide experimental correlation at lower microwave frequencies upto about 4 GHz while those computed using full-wave approach provide good correlation for the entire range of frequencies (upto 12 GHz) considered here. The theoretical results would be useful in the design of various microwave components such as directional couplers, filters and circulators.

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