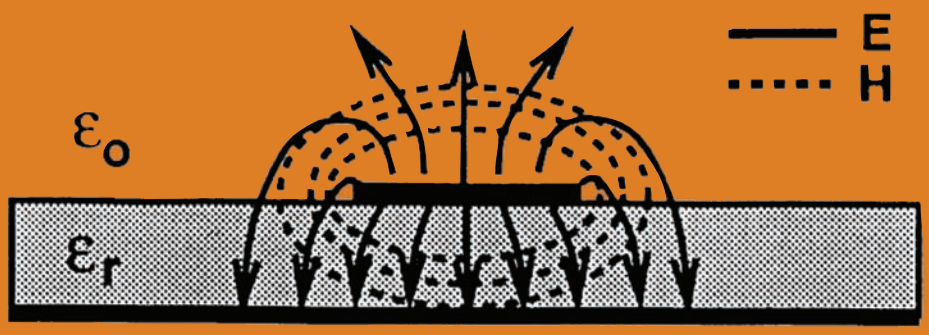
STEM Works

micro·strip [mahy-kroh-strip]

Microstrip, a type of electrical transmission line consisting of a conducting strip separated from a ground plane by a dielectric layer known as the substrate, is used to transport microwave-frequency signals. Due to its inhomogeneous cross-section, the structure does not support a simple transverse electromagnetic (TEM) wave. Since the dielectric substrate is electrically very thin, the longitudinal field components are much smaller than transverse components, allowing for a quasi-TEM approximation (the transverse pattern of the electric and the magnetic fields).



1952. The term "microstrip" is introduced by Grieg and Engelmann of ITT Laboratories in the December IRE proceedings.

1955. Fellow ITT engineer Maurice Arditi files a patent for microwave filters based on resonant sections in a microstrip line formed by discontinuities.

1965. Harold Wheeler publishes his synthesis and analysis equations based upon a conformal mapping's approximation of the dielectric boundary with parallel conductor strips separated by a dielectric sheet.

1969. M. V. Schneider publishes "Microstrip Lines for Microwave Integrated Circuits," in *Bell System Technical Journal*, providing computational methods to obtain characteristic impedance, attenuation, guided wavelength and unloaded Q of a microstrip transmission line.

1971. Jain, Makios and Chudobiak, publish rigorous field-theoretic techniques for determining microstrip dispersion characteristics. The fast formulism together with efficient numerical algorithms permitted deeper understanding of complex modes in lossless, boxed planar structures, in connection to the classical coupled-mode theory.

1997. "Microstrip Mode Propagation on a Periodically Perturbed Ground Plane via Small Etched Holes" is presented at APMC, ushering in the era of synthetic planar transmission-line structures. The periodically loaded microstrip demonstrates a slow-wave factor exceeding the theoretical limit of the square root of relative dielectric constant of the supporting substrate, rendering significant miniaturization of a microwave device at little cost of losses.