Abstracts

Broad-Band Design of Improved Hybrid-Ring 3-dB Directional Couplers (Short Papers)

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A broad-band design theory of an improved 3-dB hybrid-ring directional coupler is proposed and discussed. The synthesis of the improved broad-band hybrid-ring directional coupler starts by applying the concept of hypothetical port and generalizing the conventional hybrid-ring. The improved broad-band 3-dB hybrid-rings can be constructed very easily and their bandwidths are considerably wide, while the bandwidth of the reverse-phase hybrid-ring (one lambda ring) may be increased to approximately an octave, but it has not found wide acceptance because of its extreme difficulty of construction. The bandwidth of the improved broad-band 3-dB hybrid-ring directional coupler is 1.84 times as wide as the conventional rat race or hybrid-ring, extending from 0.747 to 1.253 in normalized frequency. Furthermore, the experimental verification has been achieved in microstrip network, and, hence, the validity of the design method proposed in this paper is confirmed. Although only the 3-dB hybrid-ring directional was considered here, the method itself is to be applicable to a hybrid-ring directional coupler with any degree of coupling.

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