以均勻阻抗及步階阻抗共振腔
設計類橢圓函數頻率響應微帶線帶通濾波器

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摘要

本論文提出在微帶線共振腔的中心點擇定饋入四分之波長的開路傳輸線段，使以此共振腔合成的濾波器產生傳輸零點。藉由在濾波器通帶兩側加入零點的結果，得到類似橢圓函數的頻率響應。因為端點開路之電路經過四分之波長阻抗轉換器，會得到虛短路的效果，故能產生傳輸的零點。根據此觀念，本文利用了兩種耦合結構合成濾波器，一個是傳統的直接耦合結構，另一個則是三線輸入/出耦合結構，後者可用來補償傳統直接耦合結構的缺點。此外，將傳統的均勻共振腔改成步階阻抗共振腔，則可使微帶線濾波器的諧波（虛假響應）頻率變高，可以得到較寬的上截止頻帶。電路之模擬和實際量測結果相當一致。

Design of UIR and SIR Bandpass Filters with an Elliptic Function-Like Response

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Abstract

Resonators tapped with λ/4 open-end stubs are proposed to design microstrip bandpss filters with transmission zeros. An elliptic function-like response can be obtained by inserting two zeros at both sides of filter passband. Based on the concept that a virtual ground can be created by an open-end λ/4 stub, we design filters by using two kinds of coupling structures. One is the traditional structure with a direct parallel-line coupling and the other is three-line coupling structure. In addition, stepped-impedance resonators (SIRs) are employed to replace uniform impedance resonators (UIRs) to push spurious harmonic to a higher frequency so that a wider upper stopband can be obtained. By the way, other structures for filter performance improvement are also presented. Several circuits are fabricated and measured, and the results show a close agreement with the simulation.

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