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**Design of quasi-elliptic microstrip bandpass
filter using terminated anti-parallel coupled-line
structure**

by

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Abstract

This thesis is about the quasi-elliptic microstrip bandpass filter design using the terminated anti-parallel coupled-line (TAPCL). The bandpass response is attributed by a single pair of transmission zeros near the passband edges. The analysis of TAPCL is carried out and its transmission zero characteristics under different terminations are also studied. To demonstrate the usefulness of the proposed quasi-elliptic filter implementations, three filter examples at 2.4 GHz are designed and experimentally characterized. The first example embeds the TAPCL element with a conventional low-order parallel coupled-line bandpass filter in order to create two transmission zeros in its upper stopband. The experimental results showed that around 16 dB spurious suppressions at 2nd and 3rd harmonic frequencies are recorded together with filter skirt selectivity improvement. The second example is about a compact quasi-elliptic bandpass implementation using coupling input and output ports at a single TAPCL element. A single pair of transmission zeros is located near the passband edges yielding a highly selective quasi-elliptic bandpass filtering, whilst the third example not only realizes the highly selective quasi-elliptic response as the second example but also demonstrates wide-stopband characteristic by using two TAPCL lowpass sections. Second and third spurious suppressions of more than 24 dB are reported. All examples reveal a simple design approach and flexibility by employing TAPCL structure in quasi-elliptic bandpass filter implementation.

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