Abstracts

Optimum Multipole Quarter-Wave TEM Filters

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Most microwave TEM filters use stub loading of a transmission line or coupled resonant elements to achieve the desired bandpass or band stop characteristics. In many cases the stubs or resonant elements are of equal line length, and are spaced equally along a transmission line at quarter-wave intervals. The spacing between filter elements in these designs provides isolation from interaction with the fields of adjacent elements but otherwise does not contribute to the filtering characteristics. A theory is presented herein which includes the quarter-wave transmission line spacers, called "unit elements," in an exact design of maximally flat and equal ripple bandpass or bandstop response filters. The theory is applicable to all microwave filter forms consisting entrely of a cascade of quarter-wave lines, quarter-wave stubs, and coupled quarter-wave lines. Each line length element characterized in the theory may be used to create a complex plane pole to augment the filter skirt response. Thus, the new theory is termed "optimum multipole."

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