

CRLH and SRR Based Microwave Filter Design Useful for Communication Applications

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Abstract : CRLH (composite right/left-handed) based and SRR (split-ring resonator) based filters have been designed at microwave frequency which can provide better performance compared to conventional edge-coupled band-pass filter designed around the same frequency, 2.45 GHz. Both CRLH and SRR are unit cells used in metamaterial design. The primary aim of designing filters with such structures is to realize size reduction and also to realize novel filter performance. The CRLH based filter has been designed in microstrip transmission line, while the SRR based filter is designed with SRR loading in waveguide. The CRLH based filter designed at 2.45 GHz provides an insertion loss of 1.6 dB with harmonic suppression up to 10 GHz with 67 % size reduction when compared with a conventional edge-coupled band-pass filter designed around the same frequency. One dimensional (1-D) SRR matrix loaded in a waveguide shows the possibility of realizing a stop-band with sharp skirts in the pass-band while a stop-band in the pass-band of normal rectangular waveguide with tailoring of the dimensions of SRR unit cells. Such filters are expected to be very useful for communication systems at microwave frequency.

Keywords : BPF, CRLH, harmonic, metamaterial, SRR and waveguide

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