Abstracts

Direct synthesis of tubular bandpass filters with frequency-dependent inductors

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A method for direct synthesis of a tubular filter with thin-film frequency-dependent lumped element resonators is presented. The synthesis procedure is developed with frequency-dependent inductors to accommodate a large parameter aspect ratio in compact configurations. The explicit design equations are derived from required coupling coefficients among resonators, which provide a great flexibility in choosing design parameters. A design example of a 4th order bandpass filter using high-temperature superconductor (HTS) thin-film material is shown which has a 0.6% fractional bandwidth, a less than 0.2 dB insertion loss and a 20 dB return loss. Experimental data show a good agreement with simulation performance. The technique is especially useful for designing ultra-narrowband filters where the proper coupling is difficult to achieve.

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