A Novel Compact Microstrip Octagonal Triplexer for Wireless Applications

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Abstract

In wireless communication, the microstrip triplexer is considered a promising solution for efficiently transmitting large quantities of data by enabling the combination or separation of three signals on the same transmission channel. In this context, this paper presents a new octagonal triplexer, which operates at 3.5, 5 and 6 GHz. The proposed structure combines both coupling and meandrous lines to form the octagonal symmetric bandpass filters that are connected to realize the compact triplexer. In order to validate the proposed triplexer design, an approximated equivalent inductance–capacitance model of the presented octagonal meandrous resonator is analyzed, developed and confirmed. Consequently, the triplexer topology is both innovative and compact, taking up a remarkably small space of 0.0033 λ_g^2 while providing high isolation (S_{23}, S_{34}, S_{24}) between the three channels of approximately 25 dB, low insertion losses (S_{21}, S_{31}, and S_{41}) of about 1.5, 1.5, and 1.46 dB, respectively, and good return loss (S_{11}) exceeding 17 dB. The proposed triplexer is fabricated and measured where the measurements and simulations are competitive. This agreement proves that our triplexer is a strong candidate for the 5 G, Wi-Fi and satellite applications.