

“Equivalent circuit analysis of left handed SRR loaded metamaterial waveguides”, pp.52-59

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Abstract – This paper reports the Left-Handed (LH) behavior of a novel transmission structure in waveguide technology taking benefit of a negative permeability synthesized via Split-Ring Resonators (SRRs). To overcome some of the existing limitations of previously reported sub-wavelength SRR-loaded metallic waveguides, we propose a structure based on its combination with inductively coupled cavities modeling a double negative media. Numerical evidence of the left handed behavior of this new guiding system is achieved by the extraction of effective permittivity and permeability, and the analysis of the frequency dependence of the phase offset between two different length transmission lines. The analysis of the composite media in terms of equivalent circuit parameters, which is also validated through an experimental prototype, demonstrates that the results obtained for unit cell and multiple cell structures allow their potential use for iterative design procedures.